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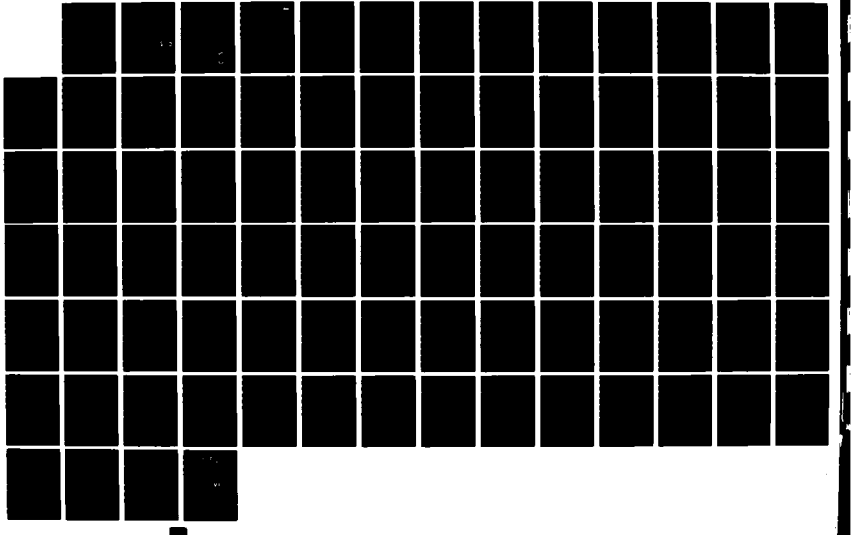

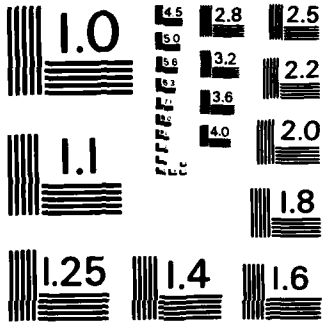

DoD CARGO MANAGEMENT SYSTEMS

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PREFACE

The effectiveness of the Defense Transportation System depends to a large extent on the data processing and management information systems the Military Departments, Defense Logistics Agency (DLA), and Transportation Operating Agencies (TOAs) use to carry out their transportation responsibilities. In response to concerns by the Office of the Secretary of Defense that those systems may be a weak link in the Defense Transportation System, we were tasked to survey them, concentrating on those supporting cargo management, and to identify areas needing improvement.

This report presents the results of that survey. Chapter 1 describes the current status of cargo management systems within the Department of Defense (DoD), discusses several new systems that are in various stages of development, and identifies some barriers to the DoD developing more effective systems. Chapter 2 introduces a recent DoD initiative to improve its logistics procedures and processes, and describes, briefly, one approach to integrating noncompatible, transportation systems that is finding favor in private industry. Chapter 3 concludes by discussing the shortcomings in cargo management systems and proposing several actions to correct those shortcomings.

The appendices list many of the data processing and information systems supporting cargo management within the Military Departments, DLA, and the TOAs and provides a brief description of each.

Executive Summary

DoD CARGO MANAGEMENT SYSTEMS

Most of the automated data processing systems supporting cargo management within the Department of Defense are old and operate on hardware that runs at or near capacity. For the most part, those systems were developed 10 to 20 years ago primarily to automate existing manual processes. They are paper intensive and require extensive manual intervention.

All major transportation organizations within the Department of Defense are developing replacement systems, and many will be operational in the late 1980's. While the new systems will correct some of the existing shortcomings, most will not have the capability to transfer transportation information electronically from one computer to another. Nor will they be sufficiently integrated with each other to correct many of the inefficiencies.

The electronic transfer of transportation information is already being accomplished in the private sector. One approach, Electronic Data Interchange (EDI), is based upon the use of industry-wide standards for transportation data. The Military Traffic Management Command has initiated development of one EDI-based system. More are needed. We believe that the recently initiated update of the Military Standard Transportation and Movement Procedures (MILSTAMP) provides an excellent vehicle for encouraging additional EDI-based systems. The Director for Energy and Transportation Policy should seek the incorporation of EDI concepts into the updated MILSTAMP.

The development of integrated cargo management systems is key to increasing the efficiency of defense transportation. To encourage that development, the Assistant Secretary of Defense (Acquisition and Logistics) needs to undertake two closely related actions. We recommend he task the Military Departments, Defense Logistics Agency, and Transportation Operating Agencies to prepare long-range information system plans that outline existing and future automation efforts. We also recommend he follow-up that action by sponsoring a forum for senior defense transportation managers. Drawing extensively upon the long-range plans, that forum should focus on the barriers to

increased system integration within defense transportation and alternatives for eliminating those barriers.

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1. OVERVIEW OF CARGO MANAGEMENT SYSTEMS

INTRODUCTION

Each year, the Department of Defense (DoD) spends several billion dollars to move cargo throughout the Defense Transportation System. Much of that cargo is shipped from supply depots operated by the Military Departments and the Defense Logistics Agency (DLA) to military and civilian customers worldwide, using the transportation assets of the Transportation Operating Agencies (TOAs) and commercial shippers.[1] To aid moving that cargo, the Military Departments, DLA, and TOAs have all developed automated cargo management systems. (Appendix A identifies almost 100 such systems.) Those systems support all aspects of cargo management, from shipment planning to billing.

In this chapter, we describe the general characteristics of the cargo management systems currently used by the Military Departments, DLA, and each of the three TOAs. We also address some of the more important systems being developed and the obstacles to development that these systems must overcome.

CURRENT SYSTEMS

Most of the cargo management systems in the Army, Navy, Air Force, DLA, and TOAs are old, operate on dated hardware that runs at or near capacity, and are difficult to modify.

The cargo management systems in the Military Departments and DLA primarily support depot operations. As shown in Table 1-1, they represent two different approaches to information system design. The Army, Navy, and DLA have umbrella-type systems, which encompass more than just cargo management. In contrast, the Air Force has 23 stand-alone processes, some of which support

[1]The three TOAs are (1) Military Airlift Command (MAC), (2) Military Sealift Command (MSC), and (3) Military Traffic Management Command (MTMC).

cargo management. The table also shows that the newest system was implemented some 15 years ago while the oldest is more than 20 years old.

TABLE 1-1. DEPOT OPERATING SYSTEMS

DoD COMPONENT	DEPOT OPERATING SYSTEM	IMPLEMENTATION
Army	SDS[1]	1970
Navy	UDAPS[2]	1962
Air Force	23 Processes	1960's
DLA	MOWASP[3]	1968

[1]Standard Depot System
[2]Uniform Automated Data Processing System for Stock Points
[3]Modernization of Warehousing and Shipment Processing

Each of these depot operating systems provides specific support in one or more aspects of cargo management — shipment planning, mode and carrier selection, documentation preparation, and management reporting — and some of that support is highly automated as a result of improvements made over the past decade. The DLA MOWASP system, for example, automatically prepares the standard Government Bill of Lading (GBL) and an enhancement to Navy's UDAPS automates shipment planning. Automation also exists in such areas as shipment scheduling, carrier tracking and evaluation, and shipment cost analysis.

Even with these improvements, however, the depot operating systems are still based primarily upon first-generation data processing technology, designed to provide electronic storage and retrieval of large volumes of information. As a result, they require extensive manual intervention, and software enhancements are cumbersome after a decade or more of patchwork modifications.

The TOAs have developed two types of cargo management systems: strategic planning and operating. The strategic planning systems assist military planners in assessing the feasibility of meeting the transportation requirements of specific wartime operations plans. The operating systems support day-to-day movement of cargo.

Table 1-2 shows the key strategic planning systems of the TOAs and the years in which they were implemented. Two of the systems are 12 to 14 years old, and only MTMC's Mobility Planning Data System (MODS) was implemented within the past 5 years.

TABLE 1-2. STRATEGIC PLANNING SYSTEMS

TOA	STRATEGIC PLANNING SYSTEM	IMPLEMENTATION
MAC	FLOGEN[1]	1973
MSC	SEACOP[2]	1971
MTMC	MODS	1980

[1]Flow Generator
[2]Strategic Sealift Contingency Planning System

MAC's planning system, FLOGEN, simulates air transportation flow and produces flight schedules that meet airlift requirements during contingencies and exercises. Two FLOGEN models are used: FLOGEN II, which is designed to process small- to medium-sized plans; and FLOGEN III, which processes large plans and requires extensive run times.

MSC's planning model, SEACOP, develops seaborne movement tables or shipping schedules based on Time Phased Force Deployment Data provided by the Joint Operations Planning System. (Appendix J provides a brief introduction to DoD's Joint Planning Structure.)

MTMC's strategic planning system, MODS, has two major subsystems: Mobility Analysis and Planning System (MAPS II) and Mobilization Shipments Configured for Operational Planning and Execution (MOBSCOPE). MAPS II evaluates the feasibility of meeting strategic transportation requirements by simulating movements of units, resupply, and replacements to both sea and air ports of embarkation. It produces movement tables and transportation plans for meeting specific operation plans. MOBSCOPE is both a strategic planning and an operating system. For strategic planning, it converts the mobilization transportation requirements of the Reserve Component into a format that can be used by the MAPS II subsystem.

Although the strategic planning systems are substantially newer than those supporting depot operations, they too have shortcomings that include the questionable accuracy or validity of their products, the massive data input and lengthy run times that they require, and the disconnect between the planning and execution that is needed for responsive adjustments to the plans.

Like their strategic planning systems, many of the TOA operating systems are old and cannot satisfy many current requirements.

The core operating systems of MAC — ADAM I and II, AMPS, AIMS, and MAIRS[2] — are all 10 years old or more. MSC's two primary operating systems, PROFORMA, which models voyage performance, and CALSTAT (Cargo Shipment Location Status and Utilization System), which reports on voyage performance, are 12 and 8 years old, respectively.

MTMC has two umbrella operating systems for managing cargo movements — TERMS (Terminal Management System) and FAST (Freight Automated System for Traffic Management) — and each system has several subsystems. Most of the TERMS subsystems were designed in the late 1970's and implemented in the early 1980's. As a consequence, some of those subsystems have extensive automation capability. For example, TERMS On-Line System-Export, among other functions, automatically transmits manifest data to overseas ports of embarkation. In contrast, however, most of the FAST subsystems are 10 to 20 years old.

In summary, most of DoD's cargo management systems were designed 10 to 20 years ago and even though many of them have been enhanced several times, their basic design prevents further substantial improvements. The deregulation of civil transportation in the early 1980's, which resulted in many new carriers moving DoD cargo, highlights the shortcomings of the DoD systems. They cannot, for example, be readily modified to analyze carrier performance and provide automated freight payment, nor can they accommodate computer-to-computer transfer of transportation information.

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[2]Aerial Port Documentation and Management System (ADAM), Airlift Management Planning and Scheduling System (AMPS), Airlift Implementation and Monitoring System (AIMS), and Military Air Integrated Reporting System (MAIRS).

PLANNED SYSTEMS

Each of the Military Departments, DLA, and TOAs recognizes the shortcomings in existing systems and is continuously developing enhancements to and/or replacements for those systems

Four new depot operating systems are in various phases of implementation (Table 1-3). The new Army system, Area Oriented Depot-Modernization (AOD-MOD), encompasses both a major distribution facilities building project and a software/hardware systems enhancement effort. The new facilities, which include state-of-the-art automated material-handling systems, are to be built at the three area-oriented depots: New Cumberland, Pennsylvania; Red River, Texas; and Sharpe, California. The depot operating system will process customer orders and track all trailers and railcars in the depot. The remaining transportation capabilities of AOD-MOD are still in the design phase. The first AOD-MOD complex will be built at Sharpe, and it is scheduled to be completed in 1987. The depots without AOD-MOD, will retain the SDS, but it will incorporate many of the AOD-MOD software improvements.

TABLE 1-3. NEW DEPOT OPERATING SYSTEMS

DoD COMPONENT	SYSTEM	SCHEDULED IMPLEMENTATION
Army	AOD-MOD	1987-1989
Navy	NAVADS[1]	1985-1988
Air Force	SC&D[2]	1985-1988
DLA	DWASP[3]	1987-1988

[1]Navy Automated Transportation Documentation System
[2]Stock Control and Distribution
[3]DLA Standard Warehousing and Shipment Automated System

The Navy's NAVADS is primarily an enhancement to UDAPS that allows it to automate the shipment planning and documentation processes. NAVADS is already implemented at Naval Supply

Centers at Norfolk, Virginia and Oakland, California and is scheduled to be implemented in the other centers in 1987 and 1988.

The Air Force is undertaking a major initiative to consolidate and enhance its 23 separate depot operating processes. The resulting system, SC&D, is being designed as an integrated, on-line, transaction-oriented system capable of improving shipment planning, mode and carrier selection, and documentation preparation. It is being developed in segments, with some segments scheduled for implementation late this year.

The new DLA system, DWASP, is envisioned as an on-line, transaction-driven data base management system. However, since much of its transportation capabilities remain to be defined, it will not be implemented until the late 1980's.

The TOAs are also making extensive investments in their cargo management systems.

MAC is developing two major cargo management systems. The Airlift Deployment Analysis System (ADANS), a strategic planning system, will replace FLOGEN and improve MAC's capability to assess the feasibility of meeting the transportation requirements of specific operational plans and to develop airlift schedules and movement tables. ADANS is scheduled to be implemented in 1986 and 1987. MAC also is replacing all existing air terminal operating systems. The new system, ADAM III, provides extensive real-time inquiry capability and introduces the use of bar code readers and hand-held terminals into cargo processing. This system is implemented at five locations and scheduled to be implemented at all MAC terminals by 1987.

MSC is just beginning a major upgrading of its cargo management systems, starting with CALSTAT for example, and has not yet defined many of the planned improvements.

MTMC is developing several major new systems, including CAMS, ASPUR, and FMCS.[3] CAMS is an automated planning and executing system that supports rapid deployment capability and MTMC crisis action needs. It should be fully implemented in 1987. ASPUR automates the process by which unit equipment lists are updated for ocean terminal shipment planning and booking

[3]Crisis Action Management System (CAMS), Automated System for Predetermined Unit Requirements (ASPUR), and Freight Movement Control System (FMCS).

during mobilization. It will correct a longstanding deficiency of inaccurate unit equipment movement data by linking MTMC area command computers with those of Installation Transportation Officers. Parts of ASPUR will be implemented in 1985. FMCS automates MTMC's selection of carriers. Past efforts to automate that important function have been stymied by the lack of a standard tender. (A tender is an offer by a carrier to move DoD freight at a specified price and service level.) However, MTMC is now preparing a standard tender format that will remove a key barrier to automating the carrier selection process. FMCS implementation has not yet been scheduled.

The Military Departments, DLA, and TOAs are developing many new systems, or modifying existing ones, and most of those systems build upon the capabilities already existing in current systems.

SHORTCOMINGS IN SYSTEM DEVELOPMENT

Two primary shortcomings hamper development of the new automated cargo management systems: they are developed in isolation and they take too long to develop. Some of the causes are unique to defense transportation; others transcend transportation and apply to most DoD system development efforts.

Defense transportation is a complex function involving several major organizations, each responsible for a segment of a given shipment. This complexity is readily illustrated by a typical shipment from an Army depot to an Army activity in Europe. A commercial motor carrier first moves a consolidated container from the depot to a container port. There the container is loaded on a commercial containership for Europe where it is offloaded at another container port and moved inland by another commercial carrier. The information flow and paperwork to execute this move involves the data processing systems of at least seven organizations: Army's depot system, MTMC's terminal system, MSC's operating system, the consignee's receiving system, and the operating systems of the three commercial carriers. The data processing systems of the four DoD activities involved in this move were developed independently, with different hardware configurations,

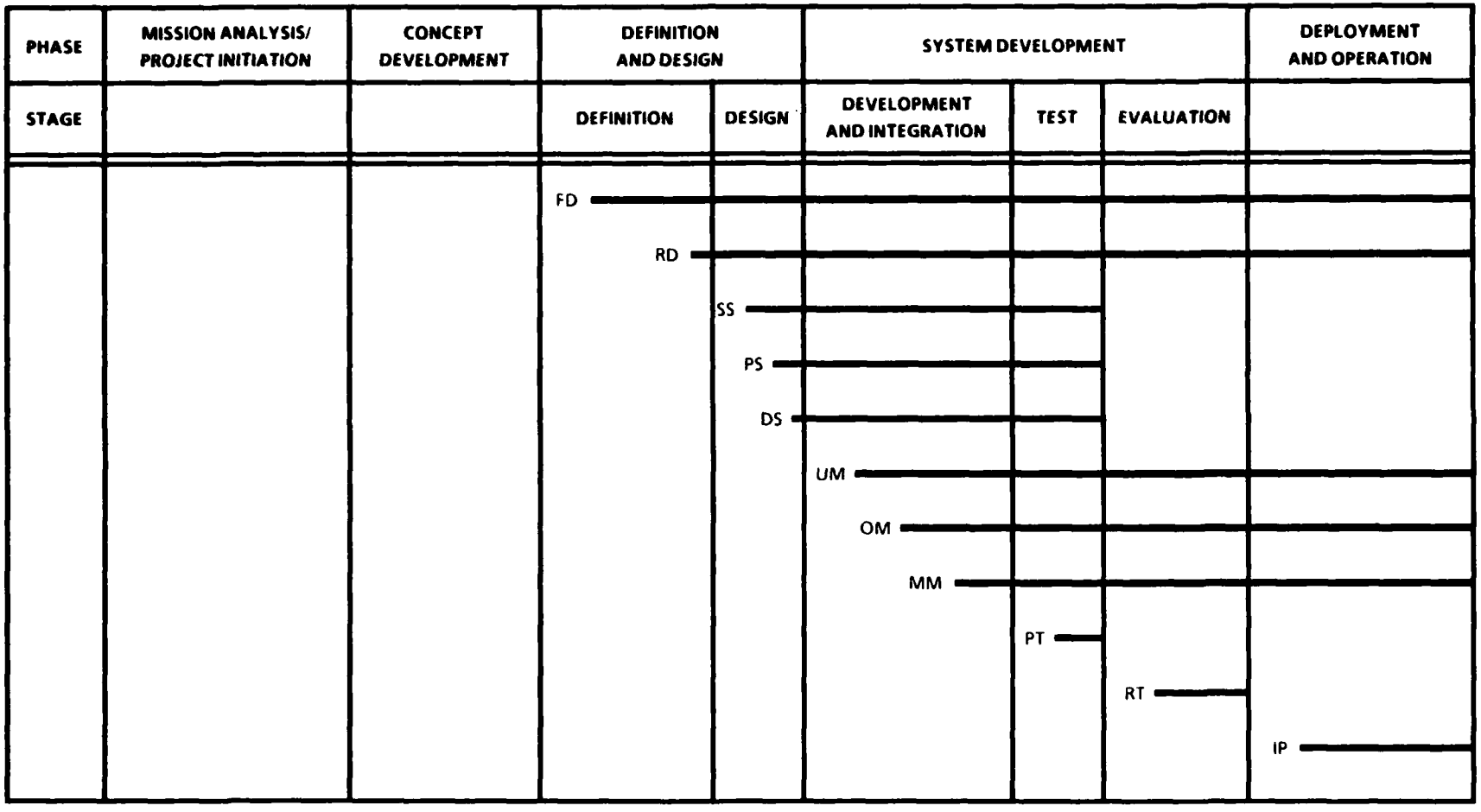
software approaches, and data base management systems. The net result is a fragmented network of incompatible systems that are paper intensive and require extensive manual intervention.

Since the complicated organizational structure of defense transportation is not likely to change in the foreseeable future, the solution to the above problems must come from the cargo management systems supporting the Military Departments, DLA, and TOAs. To date, however there has been very little emphasis and effort on developing more-integrated cargo management systems within the DoD.

A second major barrier to the development of efficient and responsive cargo management systems in the DoD is that many take from 4 to 7 years or more to develop. DoD policies and procedures guiding the development of new information systems are frequently cited as the primary reason for the lengthy developmental periods. DoD Directive 7920.1, "Life Cycle Management of Automated Information Systems" and the associated implementing instructions of the Military Departments are routinely singled out for criticism. That directive establishes the process for administering an automated information system during its life cycle, with emphasis on strengthening early decisions that influence the cost and utility of those systems. Figure 1-1 shows the life-cycle phases and stages, as well as the documentation requirements, that are specified in DoD Directive 7920.1. Those phases/stages and the documentation requirements are considered by many transportation managers to be the primary causes for the lengthy developmental times.

In the following chapter, we discuss a recent DoD initiative to improve the Defense Logistics Standards Systems and describe an approach to increasing the compatibility of nonintegrated information systems that private industry is finding very promising.

FIGURE 1-1. DEVELOPMENTAL REQUIREMENTS FOR AUTOMATED INFORMATION SYSTEMS



NOTE:

FD = Functional Description
RD = Data Requirements Document
SS = System/Subsystem Specification
PS = Program Specification
DS = Data Base Specification
UM = Users Manual
OM = Computer Operation Manual
MM = Program Maintenance Manual
PT = Test Plan
RT = Test Analysis Report
IP = Implementation Procedures

2. RELATED DEVELOPMENTS

This chapter presents two developments that are closely related to the future of automated cargo management information systems in the DoD. The first is DoD's recently initiated effort to update the Defense Logistics Standards Systems; the second is the private sector's success with an approach for making the cargo management systems of independent shippers, carriers, and consignees more compatible.

UPDATE OF MILITARY STANDARD TRANSPORTATION AND MOVEMENT PROCEDURES

The Defense Logistics Standards Systems consist of 14 standard logistics systems and programs that provide uniform policies and procedures for the interchange of logistics data among DoD components. Since the design of those 14 systems is based on data-processing concepts developed more than 20 years ago, DoD has established a joint task group for the Modernization of Defense Logistics Standards Systems (MODELS).

The objectives of the MODELS effort are to lay out a plan for modernizing the systems and then to monitor the implementation of that plan. The overall thrust of the effort is to fundamentally redesign the way DoD performs the logistics functions addressed by the 14 systems. The effort, launched in spring 1985, is not expected to bring about substantial system changes for at least 5 years.

One of the 14 systems included in the MODELS program is Military Standard Transportation and Movement Procedures (MILSTAMP), which since 1963 has prescribed standard transportation procedures, practices, and data formats for DoD Components. It establishes a basis for many transportation transactions within DoD. As a consequence, most fundamental changes in DoD's cargo management systems must begin with MILSTAMP; it is one of the foundations of defense transportation.

The next section of this chapter discusses a system design concept, currently being favored by the private sector, that can be applied to the update of MILSTAMP.

PRIVATE INDUSTRY INITIATIVES

The private sector, like DoD, is also developing many new automated cargo management systems. It has found that its greatest improvements have come from the computer-to-computer exchange of transportation information among noncompatible systems operated by independent shippers, carriers, and consignees. This type of data exchange was possible only through industry-wide adoption of a set of concepts and techniques, commonly referred to as Electronic Data Interchange (EDI).

The EDI concepts are based upon widely accepted standards for motor, rail, air, and ocean transportation. Those standards, developed by shippers and carriers working with the American National Standards Institute and the Transportation Data Coordinating Council, incorporate common definitions, formats, syntax, conventions, and procedures that allow companies to conduct business on a computer-to-computer basis. One of the driving factors behind the development of the EDI standards was the need to reduce burdensome paperwork in the transportation industry. That paperwork was not only inundating the industry, it was also the bottleneck to making operating more efficient.

The EDI standards are hierarchical in structure, beginning with transaction sets (for an entire document), data segments (for a line of information on the document), and data elements (for a specific piece of data on a line). Figure 2-1 illustrates some of the hierarchy by showing the EDI transaction set standards for the motor carrier industry. Each of the entries in the figure is a document or message format used in the motor carrier industry. For example, the first transaction set, Shipment Information, is comparable to the GBL. For each transaction set in Figure 2-1, industry has developed associated data segment standards as well as data elements standards.

To date, the use of EDI standards in the transportation industry has been concentrated primarily in the shipment status (tracing), invoicing, and payment functions. However, many shipper and carrier executives believe that the growth of EDI-based systems is the wave of the future. They cite declining computer costs, increasing telecommunications capabilities, intensive inventory

FIGURE 2-1. EDI STANDARDS FOR MOTOR CARRIERS

204	Shipment Information	800	Commercial Invoicing
205	Container/Equipment Transfer	900	Payment Authorization
206	Shipment Pick-up Order	901	Completed Payments
207	Shipment Information for Export Declaration	903	Carrier Remittance Advice
208	Shipment Information for Import	950	Consolidation Manifest
210	Freight Details and Invoice	951	Status Information from Consolidator
211	Freight Details and Invoice Summary	980	Functional Group Totals
213	Inquiry	990	Generalized Feedback
214	Shipment Identities and Status Reply	995	Advisory Information
216	Repetitive Pattern Maintenance	999	Acceptance/Rejection Advice

management, and the growth of contract carriage as factors that make today's transportation environment ripe for the electronic exchange of transportation information.

The use of EDI standards is not restricted to the private sector. A few DoD organizations are incorporating some of the standards into systems now being developed. For example, MTMC is developing an Automated Carrier Interface (ACI) system that will use EDI standards to offer and book cargo electronically with ocean carriers. It anticipates the eventual expansion of the ACI systems to include electronic shipment inquiry and status reporting as well as computer-to-computer invoicing and payment.

In summary, the DoD has just launched an effort to update its standard logistics systems, including MILSTAMP. A key characteristic of the updated systems is the capability for computer-to-computer exchange of information. The private sector has already developed an approach for exchanging transportation information among computers and that approach has application to the update of MILSTAMP.

The next chapter integrates the findings on the current status of automated cargo management systems in the DoD, the objectives of the MODELS program, and the initiatives of private industry to reduce paperwork, and it draws conclusions on how the findings should affect defense transportation. It also offers recommendations for several actions to strengthen DoD's cargo management systems.

3. CONCLUSIONS AND RECOMMENDATIONS

The major DoD transportation organizations are developing replacement data processing systems to support their cargo management functions. Many will be operational within the next few years. Most of the new systems, however, will simply upgrade existing processes; few will be able to interface with other organizations' computers. Yet, that interfacing is key to the Defense Transportation System operating as an integrated system, rather than a disjointed one. It is also key to reducing the excessive paperwork that has been part of defense transportation since preparation of the first GBL.

The private sector is demonstrating that the DoD's cargo management systems need no longer be paper intensive, require extensive manual intervention, be inefficient, and be incompatible. The EDI standards have the potential to help correct each of these shortcomings. However, the few ongoing DoD efforts to use the standards are too isolated and narrowly focused (e.g., they do not involve more than one DoD transportation organization) to have a significant impact. The DoD needs to broaden its application of those standards, and the MODELS program appears to be an ideal vehicle for doing so.

We recommend the Director for Energy and Transportation Policy, Office of the Secretary of Defense, examine the feasibility of incorporating EDI concepts into the update of MILSTAMP. If that action is successful, it will establish the basis for the development of systems that ultimately could eliminate paperwork from the Defense Transportation System.

To further ensure systems compatibility, the Assistant Secretary of Defense (Acquisition and Logistics) needs to take two closely related actions. We recommend he direct the Military Departments, DLA, and TOAs to prepare long-range system automation plans. Those plans should identify both existing and future automation efforts with particular emphasis on system interface requirements. The plans should be updated routinely.

We also recommend that he follow up that action by sponsoring an annual forum for senior defense transportation managers. Drawing extensively upon the long-range plans, that forum should focus on the barriers to increasing systems integration within defense transportation and alternatives for eliminating those barriers.

APPENDIX A

DEPARTMENT OF DEFENSE CARGO MANAGEMENT SYSTEMS

This appendix lists each of the automated cargo management systems that we examined in our survey. Subsequent appendices discuss these systems in some detail. The last two appendices provide an overview of the use of Logistics Applications of Marking and Reading Symbols (LOGMARS) techniques in defense transportation and how the joint planning structure affects cargo management, respectively.

ARMY

- Standard Depot System (SDS)
- Standard Depot System-Modernization (SDS MOD)
- Area Oriented Depot-Modernization (AOD-MOD)
- Automated Unit Equipment List (AUEL)
- Logistics Information File (LIF)
- Automation of the Army Airlift Clearance Authority
- Transportation Disbursing and Reporting
- Transportation Management Fund
- Transportation Voucher Posting
- Freight Information System

NAVY

- Uniform Automated Data Processing System for Stock Points (UDAPS)
- Navy Automated Transportation Documentation System (NAVADS)
- Navy Automated Transportation Data System (NATDS)
- NAVMTO[1] Operations and Management Information System (NAOMIS)

[1]Navy Material Transportation Office

NAVY (CONTINUED)

NARDAC[2] Bill Paying

Contract Cargo Airlift System (QUICKTRANS[3]) Control System

AIR FORCE

Shipment Document Release and Control System – D009

Regulated Materiel System – D099

Pipeline Time Recording and Reporting System – D108

DoD[4] Activity Address File and Directory System – D124

Air Force Cargo Coordination Support System-Airlift – 0002a

LOGAIR[5] Real Time Terminal System (LARTS) – 0006

Packaging and Transportation Data System – 0013

MILSTAMP[6] (ALC) – 0025B

MILSTEP[7] Central Data System – 0025E

Transportation Automated Routing System (TARS) – 0102

Transportation Automated Address and Labeling System (TAALS)

Stock Control and Distribution (SC&D) System

Enhanced Transportation Automated Data System (ETADS)

AFLC[8] Wholesale Shipping System (WSS)

Consolidation Containerization Point (CCP)

LOGAIR Transportation Management System

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[2]Naval Regional Data Automation Command

[3]Quick Transportation

[4]Department of Defense

[5]Logistics Air

[6]Military Standard Transportation and Movement Procedures

[7]Military Supply and Transportation Evaluation Procedures

[8]Air Force Logistics Command

AIR FORCE (CONTINUED)

MAC[9] Tonnage and Cost System

Surface Transportation Tonnage and Cost System

Air Force Cargo Coordination Support System–Sealift

DEFENSE LOGISTICS AGENCY (DLA)

Mechanization of Warehousing and Shipment Processing (MOWASP)

DLA Standard Warehousing and Shipping Automated System (DWASP)

Traffic Management System (TRAMS)

Automated SEAVAN Shipment Planning System (ASSP)

Transportation Rate Information System (TRIS)

Mechanization of Freight and Shipping Terminal (MOFAST)

MILITARY TRAFFIC MANAGEMENT COMMAND (MTMC)

Automated System for Transportation Data (AUTOSTRAD)

Terminal Management System (TERMS)

Freight Automated System for Traffic Management (FAST)

Mobility Planning Data System (MODS)

Mechanized Export Traffic System (METS II)

Terms On-Line System-Export (TOLS-Export)

Automated Data Distribution Processing System (ADDPS)

Terms On-Line System-Import (TOLS-Import)

Discrepancy in Shipment Reporting System (DISREPS)

Freight Loss and Damage Claims (FLDC)

Department of Army Standard Port System (DASPS)

System for Predetermined Unit Requirements (SPUR)

Automated System for Predetermined Unit Requirements (ASPUR)

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[9]Military Airlift Command

MILITARY TRAFFIC MANAGEMENT COMMAND (MTMC) (CONTINUED)

Automated Carrier Interface (ACI)

Container Management System (CMS)

Computerized Deployment System (CODES)

Logistics Applications of Marking and Reading Symbols (LOGMARS)

Freight Information System (FINS)

Section 10721 Tender Index System

Defense Freight Railway Interchange Fleet (DRIF)

Freight Classification Guide System (FCGS)

Department of the Army Standard Port System–Enhanced (DASPS-E)

Transportation Rate Information System (TRIS)

Freight Movement Control System (FMCS)

Terminal Facility Guide (TFG)

Automated Government Bill of Lading

Mobility Analysis and Planning System (MAPS II)

Mobilization Shipments Configured for Operational Planning and Execution (MOBSCOPE)

Crisis Action Management System (CAMS)

MILITARY SEALIFT COMMAND (MSC)

Strategic Sealift Contingency Planning System (SEACOP)

Sealift Strategic Planning System (SEASTRAT)

Analytic Choice of Origin Module (ANCHOR)

Scheduling Algorithm for Improving Lift (SAIL)

Prepositioned War Reserve Materiel Requirements for Petroleum, Oil, and Lubricants

Joint Strategic Capabilities Plan Reports Module

Cargo Ship Location Status and Utilization System (CALSTAT)

PROFORMA Model

Sealift Voyage Analysis Program

MILITARY SEALIFT COMMAND (MSC) (CONTINUED)

CALSTAT Improvements

Sealift Information Data Base (SID)

Unit Level Billing System (Manifest Based Billing System)

Cargo Final File

Automated Payment Reconciliation System

MILITARY AIRLIFT COMMAND

Airlift Deployment Analysis System (ADANS)

Aerial Port Document and Management System (ADAM I, ADAM II, ADAM III)

Interim Terminal Overseas Processing System (ITOPS)

Transportation Reporting and Inquiry System (TRAIS)

Military Air Integrated Reporting System (MAIRS)

Airlift Management Planning and Scheduling System (AMPS)

Airlift Implementation and Monitoring System (AIMS)

Flow Generator (FLOGEN I, FLOGEN II)

Airlift Service Industrial Fund Integrated System (ASIF)

Channel Review System

MISCELLANEOUS

Transportation Coordinator Automated Command and Control System (TC ACCIS)

APPENDIX B

ARMY CARGO MANAGEMENT SYSTEMS

INTRODUCTION

The Army Materiel Command (AMC) provides wholesale supply support to Army and other customers from stocks stored in 12 depots under the operational control of the Depot System Command (DESCOM). About 90 percent of the Army's wholesale line items are shipped from three area-oriented depots, which are responsible for providing all supply support to Army activities within a geographical area. Army depots account for 15 percent of all shipments moved under Government Bills of Lading (GBLs) and 9 percent of the tonnage.

In addition to AMC and DESCOM, Army cargo management functions are also performed by two other Army agencies: (1) the U.S. Army Finance and Accounting Center (USAFAC), which pays all GBLs for the Army, the Air Force, and the Defense Logistics Agency, and (2) the Army Logistics Control Activity (LCA), which tracks all Army requisitions and serves as the Army air clearance authority.

This appendix describes cargo management systems in the Army, briefly discusses systems that are under development, and summarizes the status of cargo management automation.

EXISTING SYSTEMS

Standard Depot System

The depot transportation function within the Army is automated through the Standard Depot System (SDS), a system designed to support all depot functions, not just cargo management. Although SDS does not have a standard hardware configuration, it is International Business Machines (IBM)-compatible. It was implemented in 1970 and enhanced in 1980, when cathode ray tube terminals were introduced to permit direct data input from remote sites. SDS supports four major transportation functions: shipment planning, mode and carrier selection, documentation, and management reports.

Shipment Planning. Shipment planning involves the combining of individual orders to form a larger shipment and reduce transportation costs. In the SDS, it consists of consolidating Materiel Release Orders (MROs), which are processed each day by Issue Priority Group (IPG) and Department of Defense Activity Address Code (DoDAAC). The basis for MRO processing is the IPG, along with the daily packing line workload limit for each packing area. (IPGs I and II are considered high priority; IPG III is considered routine.) IPG I and II MROs are released daily regardless of workload in the packing areas, but IPG III MROs are not released if the packing area is at or above 35 percent of capacity.

Two additional factors influence the consolidation of shipments. First, although the Uniform Materiel Movement and Issue Priority System authorizes the consolidation of depot processing and promulgates transportation time standards to ensure greater flexibility in planning workload and shipments, AMC has not consolidated those standards and, as a result, does not hold cargo for that purpose. Second, two Army systems, Direct Support System (DSS) and Air Line of Communication (ALOC), have significantly reduced the depot processing and transportation times for shipments overseas. The overall result is that the Army processes approximately 99 percent of its MROs the same day they are received.

The Army has adopted a procedure that trades off reduced retail level inventory and other considerations against shipment consolidation. However, transportation personnel at New Cumberland Depot, Pennsylvania believe that better workload planning, even within these time limits, could lead to greater shipment consolidation. Computer planning of workload and shipment consolidation results in preparation of a Shipment Planning Worksheet that consolidates MROs into shipment units; however, the worksheet is often inconsistent with actual work output.

Mode and Carrier Selection

The SDS, as part of MRO processing, selects one of three basic transportation modes: small pack (parcel post), less than truckload (LTL), and truckload (TL), for shipments over 10,000 pounds. The basis for the selection is weight and volume of the item being shipped.

Subsequent carrier selection is a manual process performed by shipment planners. IPG I shipments are usually moved by air. However, a manual air challenge procedure is employed to eliminate hazardous and overweight items. This procedure may be initiated by the depot or by the air challenge activity at the LCA. Through this process, IPG II shipments may be downgraded to IPG III for movement purposes. AMC Regulation 740-22 requires that less-costly, lower-speed transportation modes be used for all IPG II and III shipments and for those IPG I and II special high-priority shipments that either the consignee, AMC, or LCA have indicated as not requiring high-speed transportation.

Carriers for LTL units are selected from tenders on file. Manual records are kept at those depots where it is necessary to distribute traffic among several carriers. For shipments in excess of 10,000 pounds, Standing Route Orders are used or the Military Traffic Management Command (MTMC) is asked for a routing.

AMC uses guaranteed traffic on dedicated point-to-point routes. However, data are not available on the extent to which the Army uses the guaranteed traffic procedure.

Documentation. A substantial portion of the GBL and intransit data card documentation process is automated.[1] Data to support document preparation are obtained automatically from supporting files or are entered through remote terminals as shipment units are formed. Remote terminals are used to override file data found to be in error. Commercial Bills of Lading (CBLs) and Transportation Control and Movement Documents (TCMDs) are prepared manually. All of the elements of those documents must be entered at the time of preparation.

Management Reports. SDS periodically produces three management reports. The AMC Freight Traffic Report is a computer-generated report that shows shipment data by detailed mode of shipment, including TL, LTL, bus, and railway express. The report gives tonnage, number of lines, and estimated cost of shipment for each mode and also provides export and container consolidation

[1]An intransit data card is a reporting document prescribed in the Military Standard Transportation and Movement Procedures (MILSTAMP) for use in transportation performance measurement.

point data. The Carrier Tonnage Distribution report lists tonnage by carrier and supports the process of distributing traffic among qualified carriers. The Outbound Bill of Lading Register, a printout of bills of lading issued for a given period (e.g., daily, monthly, or quarterly), is used primarily to reconcile data and to identify large consignees.

Logistics Information File (LIF)

This file, operated by LCA, tracks all requisitions that are processed through the supply system. Using it, LCA can monitor the flow of all materiel. Shippers may inquire about the status of any shipment by telephone, through Automatic Digital Network (AUTODIN), or over remote terminals, with responses to the remote terminal inquires being given in real time.

A requisition from an overseas supply support activity is transmitted to the Defense Automatic Addressing System (DAAS) where it is routed to the appropriate inventory control point. When the inventory control point directs a depot to fill the requisition, the order is passed through DAAS. When the depot fills the requisition, a notice of shipment goes to the customer through the DAAS. At each of these three stages, an image of the transaction is sent to the LIF.

The materiel to be shipped is then sent to a container consolidation point where it is consolidated with materiel from other requisitions. A Transportation Control Number (TCN) is then assigned and a consolidated shipment status card prepared showing the TCN and all subordinate requisitions. A copy of this card is also sent to the LIF, which updates the requisition file to show the status of the requisition and its TCN.

The container is then moved to an air or surface port of embarkation where it is combined into an air or surface shipment. A manifest covering that shipment is prepared and a copy of the manifest header card, listing all of the TCNs in the shipment, is sent to the LIF. When the shipment arrives at the port of debarkation, an air or surface notice of receipt listing the TCNs, is transmitted to the LIF. Upon receipt of the materiel at the requisitioning activity, a card is transmitted to the LIF, through DAAS, to close out the LIF file. All data transmissions are through AUTODIN.

The LIF data are used to prepare a number of reports. One, the Continental United States (CONUS) report, provides information on processing times, requisition volumes, and other data related to the filling of requisitions. Another report, Monthly Performance Evaluation, shows the trends in supply and transportation pipelines.

Transportation Disbursing and Reporting

The Transportation Disbursing and Reporting System, which supports USAFAC, edits and validates the accounting records for all transportation liabilities created against the Departments of the Army and Air Force and the Office of the Secretary of Defense by commercial carriers. It processes a variety of documents, including GBLs, transportation requests, and meal tickets. For each document, it balances the detailed records and issues checks. This system operates in conjunction with the Transportation Management Fund System and the Transportation Voucher Posting System.

Transportation Management Fund

The Transportation Management Fund is a USAFAC system that receives disbursement and obligation records from the Transportation Disbursing and Reporting System. It maintains a data base of those records and eventually produces refunds and billings to field finance and accounting offices. It also supports USAFAC's internal reporting and accounting requirements.

Transportation Voucher Posting

The Transportation Voucher Posting system, also a USAFAC system, receives disbursement records from the Transportation Disbursing and Reporting System. This system is used to furnish information about payments.

Freight Information System

The Freight Information System accumulates records for GBL documents that have been disbursed. In addition to dollar amounts, it stores considerable data on each shipment, including its origin, destination, and weight. Each month, it produces a magnetic tape for MTMC and a disc file for the Household Goods System.

FUTURE SYSTEMS

Area Oriented Depot Modernization (AOD-MOD)

The Army has awarded a contract for modernizing its three area-oriented depots, to include designing and building new warehouses, automating storage and handling systems, and automating processing systems. The first AOD-MOD complex is scheduled to be operational in 1987. Development of the transportation processes, automated and manual, is in the design phase and is being monitored by AMC's Logistics Systems Support Activity. Those processes are described below.

An equipment control system will track all trailers and railcars in the depot. A control number will be assigned to each piece of equipment as it enters the depot and it will be tracked by remote terminals as it moves from point to point. This capability will enable planners to prelodge inbound equipment at a compatible docking facility. It will also be used to control the movement of equipment through the depot and avoid detention and demurrage charges.

The workload and shipment planning concepts under consideration will combine MROs into compatible shipment units with better "pick and pack" allocation for timely consolidation. Mode selection will include identification of preferred routing using existing Standing Route Orders or an indication of the need to query MTMC for routing. Air challenge requirements will be identified in advance, which will require on-line access to accurate weight, volume, and hazardous material data. Bar coding will be used throughout to facilitate picking, packing, documenting, and controlling the shipments as they move through the process. The pick ticket will be bar coded; when the MRO is produced, a peel-off bar code will also be generated. Storage locations will also be bar coded, as will the packing containers. When the pick ticket item is placed in the packing container, both the packing container and the item will be linked by a bar code. Finally, the GBL will be produced automatically from the bar-coded TCN, which will be read as the vehicle is loaded.

The cancellation process will be automated to reduce the possibility of making a shipment after receipt of a cancellation. The process being considered will give better information on where the shipment is in the depot, and even if the shipment is dropped from the records, the process will permit a last check at the shipping dock.

Areas still under consideration for improvement include management in the container consolidation point and automation of the TCMD. At present, no effort is being made to consolidate the Military Supply and Transportation Evaluation Procedures (MILSTEP) processing times to provide a greater opportunity for consolidation of shipments.

SDS Modernization

SDS will continue as a stand-alone system at all Army depots except the area-oriented ones, where it will operate in conjunction with AOD-MOD. Some of the improvements that are being incorporated through the SDS modernization system include (1) automation of the Advance Transportation Control and Movement Document (ATCMD) and the export traffic release procedures, both of which involve interface with MTMC; (2) an automated challenge of traffic data received from inventory managers at major subordinate commands; (3) the application of bar-code technology; (4) an equipment control system; and (5) an interface with the Container Management System under development by MTMC.

All of these improvements are in the early concept design phase. Details of the proposed processes are not available and no time schedules have been established for their implementation.

Automation of the Army Airlift Clearance Authority

The Army is also automating the interface for airlift challenges between New Cumberland Depot and the airlift clearance authority at LCA. The present system requires the shipping activity to manually correspond with LCA in order to obtain air clearance for a shipment. A system has been developed to capture and transport ATCMD data automatically, and that system is implemented at LCA and New Cumberland Depot where it is undergoing tests to resolve problems. Use of this system at additional sites will depend on the airlift volume at each site.

SUMMARY

The Army's shipment planning process gives little consideration to shipment consolidation except by DoDAAC. However, given the short processing times imposed by DSS/ALOC, additional shipment consolidation may be out of the question, but transportation planners at the Army's largest

depot believe otherwise. Mode and carrier selection is basically a manual process. Insufficient data are available to determine whether these two processes will be improved under AOD-MOD.

The Army has chosen to use guaranteed traffic on a point-to-point basis rather than on the geographical area basis chosen by the Defense Logistics Agency (Appendix E). Both approaches, however, provide relief from the time-consuming manual query of MTMC for rating and routing information.

APPENDIX C

NAVY CARGO MANAGEMENT SYSTEMS

INTRODUCTION

The Navy provides wholesale supply support to its own forces and other customers from material stored at stock points. The Navy accounts for approximately 10 percent of the Department of Defense (DoD) shipments covered by Government Bills of Lading (GBLs) and 4 percent of the tonnage.[1] Although the majority of Navy stock points are low-issue activities mainly concerned with local area support, they also provide wholesale support. Navy Supply Centers (NSCs), under the control of the Navy Supply Systems Command (NAVSUP), are the major distribution centers for Navy wholesale support. This appendix focuses on cargo management at the NSCs.

The Navy Material Transportation Office (NAVMTO), a NAVSUP field activity, manages the Navy's integrated transportation system, operates the Navy's management fund and air clearance/challenge program, forecasts requirements for Military Airlift Command (MAC) and Military Sealift Command (MSC), and pays GBLs and Commercial Bills of Lading (CBLs). The integrated transportation system consists of guaranteed traffic arrangements for Navy shippers. These arrangements consist of Quick Transportation (QUICKTRANS), Consolidated Truck (CONTRUCK), and the Northeast Dedicated Truck System (NDTS). In addition, NAVMTO has set up guaranteed traffic arrangements to support local delivery in a number of areas. The first of these was the Tidewater Local Drayage System (TADS), which was established in 1982.

[1]These figures are distorted for the Navy because of the substantial number of local delivery and other shipments that are not covered by GBLs.

EXISTING SYSTEMS

Uniform Automated Data Processing Systems for Stock Points (UDAPS)

The UDAPS was implemented in 1962. It processes IPG I (Issue Priority Group) requisitions as they are received and lower priority IPG II and III requisitions daily.[2] UDAPS does not have the capability to consolidate any shipment units; all consolidation takes place on the floor of the shipping area.

The mode of transportation is selected manually on the basis of IPG, distance to consignee, and transportation services available to the consignee. For small parcels, the predominant mode is U.S. Parcel Post, although the use of United Parcel Service has recently increased. Local delivery is used for customers on base or within the area for which the NSC has supply support responsibility. Carriers are also selected manually, and except for locally developed capabilities for automated preparation of GBLs at some stock points, all shipment documentation is prepared manually.

Navy Automated Transportation Documentation System (NAVADS)

This system is being added to UDAPS to enhance its automation capability for transportation processes. NAVADS is designed to automate shipment planning and shipment document preparation. A prototype NAVADS was operational at Oakland NSC, California in 1982 and at Norfolk NSC, Virginia in 1984, and it is partially implemented at two other NSCs. The Navy plans to implement NAVADS at all current NSCs in 1987.

NAVADS has three subsystems. One subsystem consists of a name and address file, a freight classification/hazardous information file, and a cargo routing information file. A second subsystem provides the capability for automated workload/shipment planning and establishes mandatory issue and packing and shipping dates. Both of these subsystems are run on the UDAPS Burroughs Corporation computer system. The third subsystem generates documentation and

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[2]The DoD uses three IPG priorities: IPGs I and II are high priority shipments, and IPG III is given routine priority.

management reports. It is resident on a Perkin-Elmer Corporation minicomputer. The following sections describe how NAVADS supports the major functions of cargo management.

Shipment Planning. Requisitions are first processed through UDAPS, which creates a stock reservation, and then they are passed to NAVADS. IPG I requisitions are not consolidated unless two such high-priority shipments arrive together at the shipping terminal.

IPG II and III requisitions are input into the NAVADS Issue File (NIF), where they are assigned a shipment control number (SCN) and held for further processing, which occurs every 4 hours. Items from the NIF are released through a mixed automated/manual process. All IPG IIs requisitions are processed daily, but IPG III requisitions are processed by mandatory issue date (MID), which is established automatically for each SCN in the NIF. The MID is the Julian[3] day by which the SCN must be shipped if the Uniform Materiel Movement and Issue Priority System (UMMIPS) standards are to be met. Each morning, the planning group identifies the earliest MID to be pulled that day to give the depot enough workload and at the same time meet the UMMIPS standards. After this decision is made, UDAPS randomly pulls for processing all SCNs with MIDs equal to or older than the date selected. NAVADS then consolidates the selected SCNs into shipment units by warehouse area, and shipments are consolidated by addresses.

Mode and Carrier Selection. Much of the mode selection process in NAVADS is automated. The principal modes of transportation used by the Navy are less than truckload (LTL), MAC, surface parcel post, air parcel post, and QUICKTRANS. However, some activities may have up to an additional 28 modes, including scheduled truck service to cover the NAVMTO guaranteed traffic and local delivery.

The use of mode of shipment codes, together with local deliveries, greatly simplifies the carrier selection process. To illustrate, at Norfolk NSC, local delivery accounts for almost 50 percent of the measurement tonnage shipped. On-base deliveries are made with government equipment, and off-base deliveries use TADS, a NAVMTO-managed guaranteed traffic system.

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[3]Numerical day of the year.

The use of guaranteed traffic further reduces the need for carrier selection. Norfolk NSC, the largest Navy shipper, has made LTL-guaranteed traffic agreements with four carriers covering nine geographical areas. (As a result of the success of these agreements, the Navy has not pursued similar agreements for truckloads.) Furthermore, those carriers also consolidate all shipments. However, the use of guaranteed traffic arrangements at Norfolk NSC is more extensive than at other NSCs.

Documentation. Because of workload at Norfolk NSC, local deliveries and parcel post, which account for 85 percent of the shipments, bypass the documentation subsystem of NAVADS. At Oakland NSC, however, those shipments are processed through the documentation subsystem. (Norfolk NSC is analyzing the possibility of including local deliveries in NAVADS when it switches to a minicomputer with more capacity.)

A Form 1348-1 is attached to every shipment when it arrives at the terminal, and the terminal location and the weight and volume of the shipment are marked on the form manually. Documentation clerks then check addresses, add carrier codes, input the shipment units SCN, and review the GBL data for accuracy. When all elements have been verified, NAVADS prints the GBL and continuation sheets. The same processes are used for Transportation Control and Movement Documents (TCMDs) and CBLs. When labels are needed, they are obtained by entering the shipment units SCNs into the computer. To print the intransit data cards, six elements are entered through remote terminals. Much of the documentation preparation process is automated.

Reports. NAVADS provides several reports for internal use, many of which focus on problem areas. It does not prepare any reports routinely for higher headquarters.

Navy Automated Transportation Data System (NATDS)

The NATDS provides automated support to three major NAVMTO functions: air clearance, GBL encoding, and financial traffic management.

Air Clearance. All IPG I and II shipments are air eligible, but they must first be cleared by NAVMTO. Upon receipt of an Advance Transportation Control and Movement Document (ATCMD) from the shipper, it is keypunched into the computer (except at NAVADS depots, which

have direct access to NATDS) and it is subjected to a three-stage automated challenge. All MAC shipments are then input directly from the computer to the MAC-operated Aerial Port Documentation and Management System (ADAM). For commercial shipments, the shipper is notified by telephone. All QUICKTRANS shipments are challenged at the terminal. If they fail the challenge, they are immediately processed for surface shipment. NATDS produces a variety of summary reports on the air-clearance process. Approximately 50 percent of all shipments initially planned for movement by air are downgraded to surface movement.

GBL Encoding. The GBL encoding process obtains the freight information data required for submission to the MTMC. All Navy GBLs are received in hard copy by NAVMTO, which extracts data manually in two separate processes, one for GBL payment and the other for the freight files. The GBL data are then processed for payment (see below). The Naval Regional Data Automation Command (NARDAC) also generates a monthly freight information tape that is sent to MTMC.

Financial Traffic Management. This subsystem is a data base containing details on all Navy shipments. It develops more than 100 reports for internal management use, covering all aspects of Navy transportation. The data are obtained from billing tapes submitted by the QUICKTRANS system, MAC, MSC, and MTMC, and from a tape used for GBL and CBL payments. Additional data are obtained from the Transportation Operating Agencies and others. This subsystem also supports the Navy Management Fund by providing the information that is used to bill Navy customers for transportation costs they have incurred.

NARDAC Bill Paying

The bill-paying process at NAVMTO is supported by two systems that are not part of NATDS. NAVMTO uses a four-phase computer system to enter the bill-of-lading data that are used for paying bills. These data, in magnetic tape format, are sent to NARDAC in Norfolk where they are processed through the NARDAC bill-of-lading program, which is run on an International Business Machines (IBM) 360 computer. The program produces reports for NAVMTO and prepares checks for payment of bills.

Contract Cargo Airlift Systems (QUICKTRANS) Control System

The QUICKTRANS control system is used by NAVMTO to manage, control, and report, on a real-time basis, the movement of cargo through QUICKTRANS, NDTS, and CONTRUCK systems. It provides a variety of reports, shipment status data, and billings to NAVMTO for each of those systems. The reports generated by this system cover route tonnage, identify point-to-point users of the system, capture transit times and contractor hold times, provide movement summaries, and show cost avoidance. Status-of-shipment data can be obtained by input of a shipment Transportation Control Number. This system provides billing tapes, showing charges by carrier, to NAVMTO monthly.

FUTURE SYSTEM

NAVMTO Operation and Management Information System (NAOMIS)

The NAOMIS is designed to integrate NAVMTO's operating systems and to enhance the automation of other operating processes. It also will provide an on-line link to the QUICKTRANS and MAC's ADAM II and III systems. The concept development phase of NAOMIS has been completed, Milestone I has been approved, and the definition/design phase is in process. However, since the functional description for the system has not been developed, additional details for this system are not available.

SUMMARY

Cargo management at Navy stock points employing UDAPS is a manual process. However, NAVADS, a much needed enhancement to UDAPS, brings to the cargo management function a substantial amount of automation. The Navy has made extensive use of guaranteed traffic arrangements in NDTS and CONTRUCK. In fact,all LTL traffic at Norfolk NSC is now covered by agreements.

NAVMTO is a unique organization among the Military Services and the Defense Logistics Agency. It combines the functions of finance centers, depots, and MTMC into one organization.

APPENDIX D

AIR FORCE CARGO MANAGEMENT SYSTEMS

INTRODUCTION

The Air Force Logistics Command (AFLC) provides wholesale supply support to Air Force and other customers. Its stock control and distribution operations are performed by depot activities at the five Air Logistics Centers (ALCs). Those activities account for 15 percent of Department of Defense (DoD) shipments covered by Government Bills of Lading (GBLs) and 3 percent of the tonnage.

Depot stock control and distribution functions are incorporated in 23 separate, stand-alone systems[1]; 9 of those systems support cargo management functions.[2] Another system supports the air terminal operations at each depot, and Headquarters, AFLC, uses several systems for control and management of transportation functions.

EXISTING SYSTEMS

Depot Operating Systems

The primary cargo management system is the Shipment Document Release and Control System (D009). It provides the data for planning shipments. Supporting this system are the Packaging and Transportation Data System (0013) and the Transportation Automated Routing System (0102). The Packaging and Transportation Data System receives data from a number of other systems and provides packaging and transportation data necessary to preplan shipments and pack, mark, and label cargo. The Transportation Automated Routing System (TARS) provides extensive data to facilitate selection of mode and carrier.

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[1]These systems were designed in the late 1950's and implemented between 1960 and 1969. All but one are batch-oriented. Five systems reside on Control Data Corporation Cyber-70 equipment, one system is on Burroughs Corporation equipment, and the remaining 17 are on the AS 3000, 5000.

[2]The annex to this appendix presents a description of the nine depot systems that support cargo management.

Shipment Planning. The Shipment Document Release and Control System is batch-oriented and can be run a maximum of twice a day. It assists in shipment planning, assigns Transportation Control Numbers (TCNs), and prepares Materiel Release Orders (MROs). The priority designation of the shipment is the determining factor in releasing MROs. (An MRO that has been assigned either Issue Priority Group (IPG) I or II is considered high priority, while an MRO assigned an IPG III receives routine priority.) IPG I and II MROs are released daily and may be consolidated into shipment units by Department of Defense Activity Address Code (DoDAAC). Very high priorities are processed as single line shipments. IPG III MROs are normally released by geographical area and may be held in the computer for up to 7 days. A maximum of 30 geographical areas may be established by each ALC. Individual DoDAACs are assigned to each geographical area on the basis of shipment volume to each consignee in order to equalize shipment volumes by area. Shipment planners determine the areas to be released in the next cycle based on workload capability.

The major products of this system are the MRO and the Shipment Planning Worksheet, which lists each MRO that has been released and provides some shipment planning data.

Mode and Carrier Selection Process. Mode and carrier selections are manual processes supported by TARS, which is a data file that each ALC compiles on transportation rates/charges and transit times. The TARS rate data, obtained from Military Traffic Management Command (MTMC)-approved tenders, apply only to Continental United States (CONUS) destinations.

For very high priority and other IPG I and II shipments, the mode selected must provide delivery to the consignee within a specified period of time. In CONUS, the preferred mode is Logistics Air (LOGAIR); all IPG I and II items destined for overseas locations are eligible for air shipment. IPG III shipments are made by the least cost mode that will meet Uniform Materiel Movement and Issue Priority System (UMMIPS) time standards for overseas shipments, those modes are parcel post or ocean carrier.

Airlift challenge for overseas shipments is conducted by each ALC, based upon weight, volume, quantity, and other factors. The Air Force uses guaranteed traffic in the form of scheduled

truck service between ALCs and activities that receive frequent shipments, including container consolidation points.

Documentation. Because the Air Force stock control and distribution system consists of noninteractive systems, most documentation is the product of manual input. The GBL and the Advance Transportation Control and Movement Document (ATCMD) are produced manually. When required, it is prepared along with the MRO, but it is subject to considerable manual change. Intransit data cards are an automated product of the Transportation Automated Address and Labeling System (TAALS).[3]

Reports. The Transportation Summary Report is a monthly history of shipments for each ALC by transportation priority and mode. It also lists single and consolidated shipments, total weight and volume data, and weight and volume data broken out by DoDAAC. From this report, an Air Force-wide summary is produced, which shows movement volume by mode and priority. The Shipment Document Release and Control System generates a variety of other reports, most of which are for internal management purposes.

LOGAIR Real Time Terminal System (LARTS)

The LARTS is installed in the terminals at all AFLC bases except at Newark Air Force Base, Ohio. It tracks cargo status in the terminal and prepares manifest cards when the cargo is loaded.

Air Force Cargo Coordination Support System-Airlift

This on-line system provides automated data for use in clearing and tracking shipments for airlift and in controlling and documenting materiel moving through the Defense Transportation System. It is used by the Air Force Distribution Control Office at Headquarters, AFLC. It processes ATCMDs and subsequent challenge messages, TCMDs, aircraft manifest data, and requests for shipment status.

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[3]An intransit data card is a reporting document prescribed in the Military Standard Transportation and Movement Procedures for use in transportation performance measurement.

Each transaction is screened twice; first, it is edited for accuracy and completeness and then it is subjected to a challenge routine to assure that the shipment routing is proper, the addressee is valid, no embargo exists on shipments, and the project for which the shipment is intended is still valid. This system and the four that follow are scheduled to be replaced by the Enhanced Transportation Automated Data System (ETADS), which is described in the section on "Future Systems."

Air Force Cargo Coordination Support System-Sealift

This system supports the Air Force Shipper Service Control function at AFLC. ATCMDs and other transactions are received daily via the Automatic Digital Network (AUTODIN) from MTMC area commands and are batch-processed weekly. This system then creates a microfiche history file that is used for requirements forecasting, financial planning, and shipment tracing.

LOGAIR Transportation Management System

The LOGAIR Transportation Management System collects and consolidates flight, cargo, and tonnage data, and maintains a LOGAIR master file of cargo movement history. A summary of each month's total operation is generated monthly. Those summaries are used to develop fiscal year programs, budget estimates, work structures, and billing statements.

Military Airlift Command (MAC) Tonnage and Cost System

This system collects detailed workload and cost data on Air Force cargo moving on MAC aircraft. Billing data tapes, which are received monthly from Headquarters, MAC, are used to develop cargo forecasts and second-destination transportation budgets.

Surface Transportation Tonnage and Cost System

The Surface Transportation Tonnage and Cost System is the same as the MAC Tonnage and Cost System, except it is used for surface movements. Billing data tapes are received monthly from the Military Sealift Command (MSC), MTMC, and the U.S. Army Finance and Accounting Center.

FUTURE SYSTEMS

Stock Control and Distribution (SC&D)

The SC&D will replace the 23 separate systems that are currently supporting stock control and distribution processes. It is divided into five basic functional processes: Allocation, Movement, Custody, Production Management, and Central Site. These processes are further subdivided by specific functional areas. As an example, shipment planning is included in the Movement process. As an integrated, on-line, transaction-oriented system, it will reduce processing times and manual input. The system will develop shipment planning data tables and schedules, which will contain all the information necessary to plan a shipment down to the point of selecting the mode and carrier for each MRO. It also will automatically plan shipment consolidations and coordinate MRO processing to establish shipment units and to meet dates for scheduled deliveries.

Several tables will be used to support this system. The Routing Table will show the preferred mode by DoDAAC and priority group; the Mode Limitation Table will show carrier limitations by mode; the Geographic Area Table will assign DoDAACs to geographical areas and show other pertinent transportation data; the Rate Table will show rates by carrier; the Carrier Selection Table will show scheduled arrival times by carrier; and the Area Release Schedule will show the day of the week for routine releases for each area.

A Document Number Master Record (DNMR), containing all available shipment planning data, will be established for each MRO. All single-line releases will be assigned a TCN, and all consolidated shipments will have a TCN/lead DNMR and a batch number. Corrected or missing file data will be provided manually. However, the SC&D System will automatically produce shipping documentation, such as ATCMDs, intransit data cards, and manifests, and a variety of management reports.

The Air Force began development of the SC&D System in 1979. It will select a hardware and software contractor in 1986, and the system should be completely implemented 3 years after contract award.

Wholesale Shipping System (WSS)

The WSS will provide the equipment to bar code MROs and shipping labels and will automatically prepare GBLs. It will eventually be incorporated in the SC&D system. The bar-coding equipment for the WSS should be available by mid-1985, and the prototype system is scheduled for completion by May 1986, with implementation at all ALCs by May 1987.

Consolidation Containerization Point (CCP)

The CCP system will reduce the need for manual data entry by using bar-code technology. Bar codes will be used to track shipments through the C/CP and eliminate the need to transcribe nearly 250,000 receiving documents annually. Bar-code readers may be hard-wired directly into the main computer that processes the records, thus eliminating the need for interfacing computers. This system is being developed at Warner Robbins ALC, Georgia. By March 1987, it will be installed at the two C/CPs: Warner Robbins ALC and Sacramento ALC, California.

Enhanced Transportation Automated Data System (ETADS)

The ETADS will redesign, integrate, and upgrade the transportation management systems at Headquarters, AFLC, bringing together five current systems that do not interact. It will reduce manual input, improve real-time capability, enable management to control worldwide movements of Air Force airlift and sealift cargo, and provide the capability to directly interact with the Joint Deployment System. The system is planned to be fully operational in 1986.

SUMMARY

The Air Force lags other DoD transportation elements in automating its cargo management function. Many of its systems are old, most use batch-processing techniques, and all require extensive manual intervention. The Air Force recognizes these shortcomings and is developing a major new depot system, the SC&D, but the development of that system has extended over 6 years already and is not scheduled for completion until 1988.

ANNEX TO APPENDIX D

AUTOMATION OF TRANSPORTATION PROCESSES IN THE AIR FORCE

This annex describes nine Air Force wholesale depot systems that support cargo management functions. Some of the systems already have been discussed or identified; others are introduced for the first time.

SHIPMENT DOCUMENT RELEASE AND CONTROL SYSTEM (D009)

This is the principal ALC system. It is a batch-processing system that runs a maximum of two cycles a day and produces MROs and Shipment Planning Worksheets. It incorporates rules for release of MROs by IPG, as well as transportation area and work center assignment tables for use by shipment planners in planning the workload.

PACKAGING AND TRANSPORTATION DATA SYSTEM (0013)

This file contains selected transportation data, by national stock number (NSN), used to plan shipments and prepare shipment documentation. The data stored in the file include weight and volume, National Motor Freight Classification, freight rating, type cargo, transportation control codes, and special codes for air and water transportation. Each ALC maintains a separate file. The data from this system are input into the D009 system.

TRANSPORTATION AUTOMATED ROUTING SYSTEM (0102)

This system provides transportation rates/charges and transit time data for use by the ALCs in selecting the mode of transportation and carrier for CONUS shipments. The transportation rate data are obtained from MTMC tenders; transit time data and preferred mode by priority are provided for all destinations. Each ALC determines the destinations that it includes in the system.

REGULATED MATERIEL SYSTEM (D099)

This is a file of hazardous materiel by NSN. It provides source data for packaging, handling, and unique transportation requirements.

PIPELINE TIME RECORDING AND REPORTING SYSTEM (D108)

This system measures the transportation time segments against UMMIPS standards.

DoD ACTIVITY ADDRESS FILE AND DIRECTORY SYSTEM (D124)

This system contains a listing of all DoDAACs.

TRANSPORTATION AUTOMATED ADDRESS AND LABELING SYSTEM (TAALS)

This system uses a minicomputer that is connected to scales and a dimension device. The computer calculates package volume, determines the lowest cost carrier for 4th class mail and United Parcel Service (UPS), addresses and prints the shipping label to include weight and dimensions, computes and assigns transportation costs, prepares air manifest and intransit data cards, and produces a daily pickup billing record for UPS. If the mode, based on weight and volume, is not correct, then TAALS rejects the item. It is then manually reviewed.

MILSTAMP[1] (ALC) (0025B)

This is a keypunch system that generates various transportation documents, such as ATCMDs, intransit data cards, surface manifests, and trailer cards.

MILSTEP[2] CENTRAL DATA SYSTEM (0025E)

This system measures transportation and supply pipeline performance against UMMIPS standards and generates reports for both the Air Force and DoD. Data used by this system are received from ALCs, MILSTEP DoD central data collection activity (intransit data), and Defense Automatic Addressing System (Material Release Acknowledgement Documents) via tape transfer.

[1]Military Standard Transportation and Movement Procedures

[2]Military Supply and Transportation Evaluation Procedures

APPENDIX E

DEFENSE LOGISTICS AGENCY CARGO MANAGEMENT SYSTEMS

INTRODUCTION

The Defen e Logistics Agency (DLA) provides wholesale supply support to Department of Defense (DoD) activities from stocks stored in six depots that are under its control and in selected depots under the control of the Military Services. DLA depots account for slightly more than 50 percent of the shipments covered by Government Bills of Lading (GBLs) and 80 percent of the tonnage. To provide the stocks to meet customer needs, DLA annually procures billions of dollars worth of commodities. The transportation of these stocks from commercial sources to DoD facilities is designated "first destination" transportation, while the transportation of stocks from wholesale depots to DoD customers is designated "second destination" transportation.

This appendix describes DLA's automated cargo management systems including three existing systems and two under development. It concludes with a brief summary of DLA cargo management automation.

EXISTING SYSTEMS

Mechanization of Warehousing and Shipment Processing (MOWASP)

The MOWASP system, which encompasses all depot functions, has been in use at DLA depots since November 1968. Its programs are written in COBAL (Common Business Oriented Language) and applied to a variety of computers in use at the depots. A 1974 modification to MOWASP, the Mechanization of Freight and Shipping Terminal (MOFAST), partially automates the shipment planning and documentation processes. The following paragraphs describe the major functional processes in the MOWASP/MOFAST configuration.

Shipment Planning. Shipment planning is the process by which individual item orders are combined to form larger shipment units and thereby reduce transportation costs. Effective shipment planning must operate within the constraints of depot workload planning and customer

needs. One objective of depot workload planning is to keep depot warehouse personnel busy. Customer needs are indicated on individual requisitions by Issue Priority Group (IPG), with IPGs I and II considered high priority and IPG III requisitions considered routine.

Requisition processing begins when a Materiel Release Order (MRO) is issued. In MOWASP, high-priority MROs (IPGs I and II) are processed in separate cycles on the day they are received. Shipment units, consisting of MROs with the same Department of Defense Activity Address Code (DoDAAC), are consolidated automatically and forwarded to transportation for final shipment preparation. Since IPG I and II requisitions, which comprise almost 50 percent of the workload, are processed the same day they are received, they present relatively few opportunities for consolidating shipment units. However, IPG III requisitions do not have the same processing urgency and are more amenable to consolidation.

The Uniform Materiel Movement and Issue Priority System (UMMIPS) allows 8 days for depot processing and 13 days for transportation hold and delivery time for an IPG III requisition. DLA has combined these two elements and reduced the total time to 15 days. For each MRO, DLA determines the date by which it must be processed to meet the on-time standard. That date takes into consideration both the depot processing time and the average time required for a shipment to reach a given geographical area. Shipment planners and depot workload planners strive to maximize the processing of MROs for a geographical area on a designated day, while at the same time balancing depot workload. MOWASP supports that effort by providing all the relevant data, but the consolidation decisions are still made manually.

The product of the shipment planning function is a proposed shipment unit consisting of several MROs. The final shipment unit that is configured on the terminal floor, often differs from the unit proposed for numerous reasons. This inability to meet a plan affects DLA's capability to automatically prepare shipping documentation.

Mode and Carrier Selection Process. After the shipment unit is configured, the mode of transportation, either small parcel or freight, is automatically determined. If the small parcel mode is selected, the system specifies whether the shipment unit should by moved by parcel post, Federal

Express (or other small package carrier), or some other type of carrier. If the freight mode is selected, the system then specifies either truckload (TL) or less than truckload (LTL). All IPG I and II shipment units are classified for air shipment. However, all air shipments are subjected to a challenge and approximately 90 percent of the shipments are downgraded to surface movement.

For small parcels, the mode selection almost always results in selection of the carrier. The selection of a carrier for TL shipments covered by guaranteed traffic agreements is virtually automatic because carriers have been preselected for the geographical area of the consignee. For TL and LTL shipments not covered by such agreements, carriers must be selected manually by a shipment planner. However, the planner must go to the Military Traffic Management Command (MTMC) for rating and routing data for TL units not covered by a Standing Route Order. For LTL shipments, the planner selects a carrier from tenders provided by the carriers and approved by MTMC.

DLA believes that it will be possible to arrange guaranteed traffic in the future for all LTL shipments, which will eliminate the manual carrier selection process. As it is, the guaranteed traffic coverage currently available limits the need for extensive rate and carrier analysis systems.

Documentation. MOWASP prepares the standard GBL, its continuation sheet, and the continuation sheet for the Commercial Bill of Lading (CBL). It also prepares the Transportation Control and Movement Document (TCMD) formats and intransit data cards. It does not, however, prepare the CBL; it must be prepared manually.

Management Reports. MOWASP provides DLA managers with a wide variety of reports that are used in workload and shipment planning, workload processing, delivery times analysis, and carrier performance analysis. Although MOWASP does not have the capability for exception reporting, the reports dealing with workload processing and delivery times provide the average times required to perform various processes.

Using data obtained from several sources, the DLA Central Data Collection Agency, located at the Tracy Depot, California, prepares the Military Supply and Transportation Evaluation

Procedures (MILSTEP) pipeline performance analysis report. That report is not a direct product of MOWASP.

Automated SEAVAN Shipment Planning (ASSP) System

The ASSP system is a separate module of MOWASP designed to control, plan, and document MROs for movement in SEAVAN containers. (The use of those containers is limited to IPG III MROs except for IPG II MROs for direct commissary shipments of subsistence items.) Using SEAVAN capacity and compatible cargo code tables and the MOWASP address file, which indicates destinations/consignees who are eligible for SEAVEN shipments, ASSP automatically consolidates MROs into SEAVAN loads each day. It also prepares and distributes shipment documentation automatically, including the SEAVAN Load List, SEAVAN Consist, and the TCMD.

Transportation Rate Information System (TRIS)

The Defense Fuel Supply Center (DFSC) is responsible for DoD-wide bulk fuel supply, a multibillion dollar annual business. In fiscal year 1984, DFSC purchased $79.5 million of Continental United States inland transportation services, $65 million of coastal tanker services, and another $375 million of intercontinental and overseas transportation services.

DFSC uses an automated bid evaluation system, based upon a model that considers both product and transportation costs for contracts covering the entire United States, to determine the successful bidder on JP-4 and JP-5 fuels transportation contracts. Current transportation rates for all modes except ocean tankers are entered into TRIS. At present, TRIS contains about 5000 JP-4 and J-5 rates, out of a total of 25,000 rates for all modes and products. Contracts that are not supported by the bid evaluation model are processed manually.

If the TRIS were expanded to incorporate all rates considered by the DFSC, it would be possible to automate the entire bid evaluation process. DFSC desires such an expansion, but it would have to modify TRIS to accommodate the rates projected to be in effect at the time of shipment, rather than those currently in use.

FUTURE SYSTEMS

DLA Standard Warehousing and Shipment Automated System (DWASP)

DWASP is a distributed, on-line, real-time, transaction-driven data base management system that will completely update the MOWASP system. However, its development, which is currently in the planning stage, has been considerably delayed. One DWASP module, covering the depot receiving process, is being implemented on MOWASP hardware, but the transportation module will not be developed for another 2 years. We were unable to obtain any information on how the cargo management capabilities of this module will differ from those of MOWASP.

Traffic Management System (TRAMS)

The Defense Contract Administration Services (DCAS) consists of 9 regional offices and 38 subordinate management areas. The primary transportation function of DCAS is to ensure the timely delivery of materiel to users or storage points for all free on board (FOB)-origin contracts. In fiscal year 1984, DCAS issued 138,000 GBLs (about ten percent of all the GBLs issued in DoD) and procured $91.8 million worth of transportation services. Currently, DCAS develops all GBLs and related documentation manually. It also selects carriers manually, with the assistance of MTMC.

DCAS is developing an automated traffic management system, TRAMS, that will automate the preparation of bills of lading and other documentation and the compiling historical shipping data. A DCAS contractor is developing a functional baseline specification for TRAMS, but DCAS has not made any other decision regarding TRAMS, including when it will be implemented.

SUMMARY

MOWASP is an old system that requires considerable manual intervention in the cargo management process. The 1974 upgrading of MOWASP (with MOFAST) gives it the capability to automatically generate many shipment documents, including the GBL, with a minimum of manual input. Although DLA still selects carriers manually, it makes extensive use of guaranteed traffic agreements. Further, automation of the carrier selection process by DLA is dependent upon MTMC automating its rating and routing process.

DLA recognizes the importance of shipment planning. MOWASP automatically provides a variety of products to the shipment and workload planners to assist them in maximizing shipment consolidations. However, DLA's planning techniques are not very sophisticated and efforts to use them are often thwarted by the complexity of depot operations. As a result, many shipments are put together on the shipping room floor. With the information available, we could not judge whether the shortcomings of the current system will be corrected in the proposed DWASP system.

Except for the rate file used in evaluating bids at DFSC, DLA has not automated the cargo management function supporting first-destination transportation. However, DCAS is formulating plans to automate its transportation management processes.

APPENDIX F

MILITARY TRAFFIC MANAGEMENT COMMAND CARGO MANAGEMENT SYSTEMS

INTRODUCTION

The Military Traffic Management Command (MTMC) is the Department of Defense (DoD) traffic manager for cargo and passengers, the single manager of common-user ocean terminals, the transportation strategic mobility planner, and the manager of the worldwide personal property moving and storage program. MTMC's automated systems are part of the Worldwide Military Command and Control System (WWMCCS).

MTMC makes extensive use of Honeywell Corporation computers. It has three DPS8s and two Level 6 minicomputers at its headquarters. The two area commands each have three Level 6 and one DPS6 computers. An additional seven Level 6 computers are at individual outports and terminals.

The major organizational elements of MTMC with cargo management responsibilities are the Headquarters, Eastern and Western Area Commands, and the Military Ocean Terminals. The operations staff of Headquarters, MTMC, consists of the Directorates of Plans and Strategic Mobility, Inland Traffic, International Traffic, Personal Property, and Passenger Traffic. In this appendix, we focus on the systems supporting the first three organizations.

Under the umbrella heading of the Automated System for Transportation Data (AUTOSTRAD), MTMC has 6 major systems made up of 43 subsystems. Some of the subsystems are operational, and others are in the planning stages. The three cargo management systems that are pertinent to this survey are the Terminal Management System (TERMS), which supports International Traffic; the Freight Automated System for Traffic Management (FAST), which supports Inland Traffic; and the Mobility Planning Data System (MODS), which supports Plans and

Strategic Mobility. In the balance of this appendix, we describe briefly how these and future systems support MTMC's cargo management function.

TERMINAL MANAGEMENT SYSTEM

TERMS is comprised of 12 subsystems; 7 are currently being used and 5 are planned for future use. All but two, Discrepancy In Shipment Reporting System and the Freight Loss and Damage Claims, are associated with terminal operations.

Existing Subsystems

Mechanized Export Traffic System (METS II). This subsystem, implemented in March 1984, supports the area command cargo offering and booking offices. It is an on-line, interactive system that receives and processes offers of overseas shipments (Export Release Requests) from shippers for Release Unit Shipments (over 10,000 pounds). About 90 percent of those offers are received via the Automatic Digital Network (AUTODIN). After receipt of an Export Release Request, MTMC personnel manually select the inland and ocean carriers and rates, the ports of embarkation, and shipment dates. This information is then input through computer terminals to METS II. Area command personnel manually book break-bulk cargo with the Military Sealift Command (MSC). The shipper is then notified of the rating and routing. All edits, updates, reoffers, cancellations, adjustments, and corrections are processed through the METS II master file. METS II automatically provides a skeleton Transportation Control and Movement Document (TCMD) to the TERMS On-Line System-Export (TOLS-Export). The TCMD is later updated with information from the shipper's Advance Transportation Control and Movement Document (ATCMD).

Although the METS II is a recent subsystem, its major decision functions are manual. When the export release request is received, transportation specialists must determine the date and port of shipment, select an ocean carrier, and provide inland rating and routing data. Although carrier and port selection could be automated locally, inland rating can be automated only after MTMC has automated its tariff management system.

TERMS On-Line System-Export (TOLS-Export). The TOLS-Export subsystem, implemented in 1982 in its current form, is used to control and monitor export cargo movements, maintain movement records, provide status to shippers, and prepare manifests.

ATCMD's received directly from shippers for small shipments or from METS II for shipments over 10,000 pounds are preloaded in TERMS On-Line System (TOLS). Using remote computer terminals at the ocean terminals, incoming shipments are tracked as they are received, repositioned in the ocean terminal, and loaded aboard ships. At the time of loading, TOLS generates a hard copy ship manifest based on local input and the ATCMD data, and transmits manifest data to overseas ports of debarkation. A history file of shipments is maintained for 90 days for tracking purposes. Receipt and lift data are sent to the Military Supply and Transportation Evaluation Procedures (MILSTEP) central data collection point for report generation.

An enhanced TOLS, the TOLS Automated Data Distribution Processing System (ADDPS), also known as "NETWORK," will be operational in 1985. Instead of concentrating TOLS processing at the area commands, ADDPS automatically extracts data from the ocean terminal computers to update the central data base.

Much of the TOLS process requires manual input. However, Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) technology has the potential to substantially enhance the automation capability of TOLS. The feasibility of that technology has been demonstrated for unit moves (see Appendix I). In 1985, MTMC is anticipating that 300 bar-code reader-recorders will be in place at its Continental United States (CONUS) terminals. Those reader-recorders will not be installed in overseas terminals until the Department of the Army Standard Port Systems-Enhanced (DASPS-E) is implemented.

TERMS On-Line System-Import (TOLS-Import). The TOLS-Import subsystem monitors all cargo shipped from overseas ports to CONUS terminals. It is a batch processing system that uses punch cards to generate documents and reports for movement planning and control. Most of the imported cargo consists of privately owned vehicles and household goods. Transactions such as the discharge of cargo, shipment consolidation, and the departure from terminal to CONUS inland

destinations are submitted by the ocean terminals for status reporting. TCMDs are automatically prepared from manifest data, and Government Bills of Lading (GBLs) are manually prepared. Transaction data are used to pay stevedore contractors and to bill shippers.

Department of the Army Standard Port System (DASPS). The DASPS is a batch-mode, punched-card subsystem used to support operations at ocean terminals in overseas areas managed by MTMC. For the export process, DASPS automates cargo receipt and vessel load planning and manifesting. The shipper offers cargo on hard copy or punched-card TCMD. The shipping data are then entered in the system and a prepunched card packet is produced for the receipt, release, and loading of cargo. In the import process, the advance manifest, received via AUTODIN, is used to prepare internal management documents and the TCMD. DASPS is currently running on 20-year old equipment and is scheduled for replacement by DASPS-E.

System for Predetermined Unit Requirements (SPUR). The SPUR subsystem processes requests from Installation Transportation Offices (ITO) to move unit equipment from a CONUS base to an overseas area. The unit equipment data are taken from an Automated Unit Equipment List (AUEL) provided by the U.S. Army Forces Command's, Computerized Movement Planning and Status System (COMPASS). Upon receipt of the request, an area command enters the data in the SPUR subsystem. It then manually books a ship, selects a terminal, and arranges for inland transportation to the terminal. (These processes are similar to those performed under METS II for cargo movements.) The booking and routing data are also entered into SPUR. Information on the inland transportation and the port call is then provided to the ITO by telephone. SPUR interfaces automatically with TOLS where the ATCMDs and manifests are prepared.

This process relies on Army data that do not accurately portray unit equipment status. It also places a heavy reporting burden on the ITO from which the unit is deploying. An enhancement to the system, Automated SPUR, is being planned and it is discussed in a subsequent section of this appendix.

Discrepancy In Shipment Reporting System (DISREPS). The DISREPS is a DoD-wide shipment discrepancy reporting system that is managed by the Eastern Area Command. The basis

for this system is the Standard Form (SF) 361 used by all Government agencies to report transportation discrepancies. Data from those forms are keypunched at area commands, and copies are sent to finance centers for use in initiating claims against carriers. MTMC uses the data to identify problem areas and seek corrective actions.

Freight Loss and Damage Claims (FLDC). The FLDC subsystem collects data on all claims placed on carriers by the Government. Using the SF 361, finance centers generate a SF 362, which is also sent to the carrier as a Government claim. A hard copy of the SF 362 is also sent to MTMC where it is keyed into the FLDC. MTMC then compares that information with the loss reported on the SF 361.

The DISREPS and FLDC systems are very similar and some MTMC personnel have expressed a desire to combine them.

Future Subsystems

Automated Carrier Interface (ACI). The ACI subsystem will use the Electronic Data Interchange (EDI) standards to provide an automated interface between MTMC's computers and those of U.S. shipping lines. The ACI subsystem will be implemented in three phases: Phase 1 will focus on cargo offering and booking; Phase 2 will cover equipment control; and Phase 3 will address billing invoices.

In Phase 1, MTMC will offer cargo container data to a carrier, which if it accepts the booking, will respond with specific container and voyage information. In Phase 2, the ocean carrier will provide container status and location every time a change occurs. In Phase 3, the invoice will be electronically transmitted to MSC for payment.

Phase 1 is currently being tested with two carriers. If that test is successful, then Phase 2 should follow in late 1986. The invoices for Phase 3 are already being transmitted by carriers to MSC. When MTMC is capable of transmitting shipping and clearance orders as well as manifests electronically, and when MSC is capable of electronically matching the data on all three documents, it will be possible to process the verified invoices without manual intervention.

Container Management System (CMS). The CMS system is will give MTMC the capability to oversee worldwide DoD container movements during mobilization using a consolidated data base containing data from METS II, TOLS, shippers, and carriers. It will control DoD-owned/managed containers and will monitor the performance of shippers, ocean carriers, and MTMC traffic managers. Access to CMS will be available worldwide through intelligent terminals in Military Export Cargo Offering Booking Offices, in MTMC terminals, and in headquarters activities. CMS will not be implemented for at least 2 years.

Department of the Army Standard Port System-Enhanced (DASPS-E). In 1978, the Army decided to update DASPS (described previously) with Honeywell computer equipment installed in mobile units being designed for Army field units. A system qualification test is scheduled for 1985. If successful, it will take another year to field the new equipment. The new system will give DASPS an on-line capability. A batch update capability will be added in a later enhancement.

Computerized Deployment System (CODES). CODES is an automated load-planning system designed to accelerate ship loading. It will build a characteristics file for every vessel used to move troops and equipment. CODES will use microcomputers and standard software. Its feasibility was demonstrated during REFORGER 85. A functional description will be prepared in mid-1985 and the system is scheduled to be implemented by October 1987.

Automated System for Predetermined Unit Requirements (ASPUR). The ASPUR subsystem is an enhancement to SPUR that will give MTMC area commands the capability to connect directly to ITOs through computer terminals supporting the proposed Transportation Coordinator Automated Command and Control Information System (TC ACCIS). This capability will allow ITOs to quickly update the AUEL data on file in COMPASS. The rating, routing, shipping, and port selection processes will continue to be done manually. However, those processes will be recorded in the METS II system, which will automatically send a ATCMD to TOLS. Load planning will also be done manually until CODES is implemented.

ASPUR will be ready in 1985 and will be put into use even though ITOs will not have the TC ACCIS computer terminals. The incorporation of ASPUR data into METS II will reduce the manual effort at area commands.

Although the following system is not a subsystem of TERMS, it is described in this section because MTMC is developing the system and it is closely related to TERMS.

Transportation Coordinator Automated Command and Control Information System (TC ACCIS). The TC ACCIS is a command-and-control information system. In its original conception, TC ACCIS was to be a Joint Chiefs of Staff (JCS)-sponsored standard system that would generate timely and accurate unit movement requirements information and the documentation associated with unit deployments. However, when the other Military Services objected to a standard system, the Army independently developed a prototype system and successfully tested it.

Since that test, which was completed in May 1985, the requirements for movement information have been reexamined. JCS now has developed a new Required Operational Capability document. The new requirements will expand the process of reporting information, including the reporting of all cargo movements from installation and depot activities. Details of the system remain to be developed.

MTMC is the Army's project manager for the TC ACCIS and it is developing a functional description with contractor support. The Army plans to implement this system in 1988. The other Military Services will develop their systems independently.

FREIGHT AUTOMATED SYSTEM FOR TRAFFIC MANAGEMENT (FAST)

The FAST system provides automated support for MTMC inland traffic functions that include managing traffic for freight movements; negotiating with carriers to obtain tenders;[1] establishing rules and regulations for DoD traffic; and maintaining a statistical data base to support MTMC traffic management functions. In the future, MTMC also will have a GBL audit function.

[1]A tender is an offer to do business with the DoD at specified rates. The rates may apply to specific routes or to geographic areas.

FAST consists of eight subsystems; four are currently in use and four are planned for future implementation. The major planning effort is focused on the Freight Movement Control System (FMCS), primarily because automating carrier rating and routing tenders would remove a major bottleneck in the automation of depot and other shipping activities cargo management functions.

Existing Subsystems

Freight Information Systems (FINS). The FINS is an automated repository of all GBL data. Every finance center converts the GBL data to tape format for input into FINS. The basic product is three reports that contain summaries of GBL information such as origin/destination, freight classification, and method of transportation. Those data are used in negotiations with carriers for routes and services, in traffic distribution studies, in transportation budget preparation, and in other management and planning processes.

Section 10721 Tender Index System. This subsystem is an electronic library of all tenders received by MTMC. For each of approximately 10,000 tenders on file, the index lists origin/destination and commodity class. No rates are included in the index. The file is primarily used to answer carrier queries as to whether their tenders have been received. Hard copies of all the tenders are sent by mail to the area commands where they are used for rating and routing requests.

Defense Freight Railway Interchange Fleet (DRIF). The Eastern Area Command manages the MTMC rail fleet. The DRIF subsystem contains information on each railcar in the fleet and provides historical data on movements, revenues, expenses, inspections, tests, and supply accountability. It uses those data to calculate average transit times, to project estimated arrival times when a railcar is shipped, and to forecast and schedule maintenance.

Transportation Rate Information System (TRIS). The TRIS is a joint initiative between MTMC and the Defense Fuel Supply Center (DFSC) that provides DFSC with freight rates for JP-4 and JP-5 aviation fuels. DFSC inputs into TRIS a skeleton record consisting of origin, destination, product code, shipment modes, and other pertinent data; and MTMC's Eastern Area Command then adds the rates and carriers. Ultimately, the data are used by DFSC in a bid evaluation model that provides the least-cost bid considering product and freight costs. DFSC reports, however, that the

rates and carriers provided by the Eastern Area Command have to be carefully reviewed for errors before they can be used in its bid evaluation model.

Future Subsystems

Freight Classification Guide System (FCGS). The FCGS contains freight classification and related transportation information for each item in the DoD supply system and is used by shippers to prepare shipment documentation. The FCGS is a component of the Defense Integrated Data System, which is operated by the Defense Logistics Services Center (DLSC), an agency of the Defense Logistics Agency (DLA). Under the present procedure, DoD item managers submit proposed freight classification data to DLSC by item name rather than by national stock number (NSN). (This procedure poses a problem since the item name is inadequate for assigning freight classification.) MTMC reviews the data before they are entered into the FCGS.

The process is being revised to incorporate two changes. First, item managers will submit freight classification by NSN, which will make it more accurate, and the data will be entered directly into the FCGS. Second, MTMC will review the data on a sampling basis. These changes should improve freight classifications and eliminate the MTMC bottleneck in confirming the freight class of an item. DLA estimates that FCGS will be revised in mid- to late-1986.

Freight Movement Control System (FMCS). The FMCS automates the process by which shippers obtain rating and routing information from MTMC. That information is vital to the inland transportation function since it provides the basis for selecting the carrier. Currently, carriers submit offers to carry DoD goods over specified routes (or over general areas) at rates that are quoted in several ways and to which various accessorial charges may be added. Those offers are submitted in the form of tenders. Currently, there is no standard format for tenders,[2] and since deregulation, the number of tenders submitted has increased dramatically. When agreed to by MTMC, the tenders then become the basis for decisions on carrier selection. Today, the process is manual, requiring either MTMC or the shipper to look up carriers' rates and routings on hard copies of tenders. As a

[2]MTMC is in the process of developing a standard tender.

result, it is often difficult, if not impossible, to find the lowest rate. Furthermore, shippers routinely encounter long delays when they come to MTMC for information.

To remedy this situation, MTMC has spent several years trying to automate the tender file so that any shipper can query the file and determine the best rate. Unfortunately, the efforts have not been successful. By mid-1985, a modified form of FMCS will be available. While it will not provide shippers with an automated source of rate and route data, it will have 395,000 rates on-line, with nightly batch updates. The modified FMCS will permit origin/destination searches by MTMC personnel; it also will provide a printout ranking all carriers according to line-haul charge, with minimum charges shown when applicable. Accessorial charges will still be determined manually, however.

MTMC has contracted with the Transportation System Center (TSC) to evaluate current commercial systems that provide rating and routing data rather than develop such a system in-house. TSC will provide an economic analysis and prepare specifications and a request for proposal. This study is scheduled to be completed in 1986.

Terminal Facility Guide (TFG). The TFG subsystem will be a reference file containing information on the shipping and receiving capabilities of approximately 1,500 major DoD installations and commercial contractors. It will be used by ITOs to plan the economical movement of freight and passengers in CONUS. The TFG subsystem will ultimately be an integrated communications network permitting information retrieval via remote terminal access by all DoD transportation officers. The data for this reference file currently exist on microfiche.

Automated Government Bill of Lading (GBL). Each shipper in the DoD must submit copies of GBLs to MTMC, which uses them for a number of purposes, including analyses of traffic patterns, shipper performance, and GBL errors. Today, GBLs are submitted in hard copy format by mail. As a test, DLA submitted its GBLs to MTMC in tape format, but the test was temporarily suspended because of problems. No estimate of an operational date for this system is available.

MOBILITY PLANNING DATA SYSTEM (MODS)

MODS, a decision support management information system, assists transportation planners in mobility planning and deployment monitoring and analysis, particularly JCS and Army contingency plans and transportation requirements.

Existing Subsystems

Mobility Analysis and Planning System (MAPS II). MAPS II supports the Joint Deployment Agency (JDA) Operation Plan (OPLAN) refinement process by providing a basis for evaluating the feasibility of meeting the transportation requirements of specific OPLANs. It validates input data and converts them into a master record for processing planned movements of units, resupply, and replacements from point of origin to surface points of embarkation. For sea deployments, MAPS II determines feasible movement dates, means of transportation, and seaports of embarkation. For air deployments, it verifies that cargo and passenger movements can be scheduled to meet aerial-ports-of-embarkation departure dates scheduled by the Military Airlift Command. MAPS II also provides MTMC with a movement table that is used to determine whether it can support a specific OPLAN.

Mobilization Shipments Configured for Operational Planning and Execution (MOBSCOPE). MOBSCOPE is a planning and execution subsystem for the movement of reserve component units from home stations to mobilization station. It lists all unit equipment that must be moved by commercial transportation. For planning purposes, MOBSCOPE software converts those data into a format that can be processed by MAPS II. For the execution portion of the subsystem, the movement requirements prepositioned at MTMC are updated through terminals. Upon execution, MOBSCOPE combines those data with continually updated movement dates from the U.S. Army Forces Command and then produces a variety of management reports. Those reports, once verified by ITOs, constitute requests for commercial transportation.

Future Subsystems

Crisis Action Management System (CAMS). The CAMS will provide MTMC with an automated planning and execution subsystem to support JDA and MTMC crisis action needs. MTMC

has contracted with Oak Ridge National Laboratories, Tennessee to provide functional descriptions of six modules. The functional description for two of those modules — the ITO/MTMC Interface Module and the Ocean Terminal Support Module — have already been developed.

The ITO/MTMC Interface Module will provide an interim linkage capability between the ITOs and ASPUR pending the final decision on the implementation of the TC ACCIS system. That capability, in the form of a microcomputer at each base, will enable the ITO to modify AUEL data in requesting rating and routing data for a unit equipment move. A prototype demonstration of this module is scheduled for October 1985.

The CONUS Ocean Terminal Support Module will consist of two submodules. One, Terminal Operations Management System, will give each ocean terminal the capability to use the TOLS data base for such purposes as crew planning, scheduling, and cargo planning. It will also provide a point of entry for LOGMARS data into the TOLS system. This submodule will be dependent upon the Level 6 computers to be placed at each terminal under TOLS Networking. The second submodule, the Remote Port Operations Management System, will provide microcomputers to remote outports where they will emulate a Level 6 terminal for on-line TOLS updating. The functional description for the CONUS Ocean Terminal Support Module has been completed, and a system demonstration is scheduled for August 1985.

Functional descriptions have not yet been developed for the other four CAMS modules. The Passenger Traffic Module will provide an automated interface with bus and air carriers and will link the system to installations and to the Joint Deployment System. The Headquarters Analysis Module will contain a transportation networking model that will enable MTMC to provide closure estimates during crisis situations. With the Area Command Support Module, the commands will be able to analyze planning and execution information. That module will expand on ASPUR's capability and have input capability to the Headquarters Analysis Module. The Exercise Enhancement Module will be used by the area commands in exercises to simulate ITO submissions within the METS II and TOLS systems. These four modules are tentatively scheduled to be operational in 1987.

Summary

MTMC has recently enhanced its terminal operating systems. However, some critical processes are still manual, and advanced technology, such as bar-coding and hand-held terminals, is not being used. Some of the new systems will have the capability to eliminate these deficiencies with minimal programming impact.

The failure of MTMC to develop an automated rating and routing system has had a major impact on DoD cargo management. Shippers complain of delays and inaccuracies in obtaining rating and routing data under the current manual system. The automated tariff management systems in use or planned for local use will still require each activity to manually input its tariff data.

APPENDIX G

MILITARY SEALIFT COMMAND CARGO MANAGEMENT SYSTEMS

INTRODUCTION

The Military Sealift Command (MSC) controls, operates, and administers a Government-owned fleet of ships and contracts for the use of other ships to move Department of Defense (DoD) personnel, cargo, and bulk petroleum. MSC is responsible for obtaining all commercial sealift support for DoD. It enters into contracts with carriers and establishes rates based on those contracts, and it pays sealift carriers from a revolving fund that is reimbursed from billings placed by the Military Traffic Management Command (MTMC) on DoD shippers. MSC is also responsible for preparing long- and short-range forecasts of sealift requirements, based on its evaluation of requirements submitted by DoD Components. MSC receives computer support for its cargo-related systems from various sources. The Cargo Ship Location Status and Utilization System (CALSTAT) is maintained on the MTMC Level 6 Honeywell computer system, the PROFORMA model is run on the Naval Surface Weapons Center's Control Data Corporation 6700 computer, and the Strategic Sealift Contingency Planning System (SEACOP) operates on the Chief of Naval Operations Worldwide Military Command and Control System (WWMCCS) computer. Many of MSC's automated processes use batch modes and are dependent upon substantial manual input. In 1981, MSC launched an effort to modernize its systems, but that effort was interrupted by the issue of merging the MSC and MTMC organizations. A subsequent embargo on the development of new system was not lifted until 1985. As a result of this hiatus, MSC officials hesitate to forecast when the needed major system improvements will take place.

This appendix describes MSC's automated systems, as well as those systems that are planned for the future. It concludes with a brief summary of the status of cargo management automation within MSC.

EXISTING SYSTEMS

Strategic Sealift Contingency Planning System (SEACOP)

The SEACOP is a computerized planning model that develops shipping schedules (or movement tables) to meet dry cargo; bulk petroleum, oil, and lubricants (POL); and troop deployment requirements in support of contingency plans. The requirements are received in Time Phased Force Deployment Data (TPFDD) file format. Ship resources used in developing the movement tables are based on a "snapshot"of ship locations taken from Joint Chiefs of Staff (JCS) planning documents. In addition to the TPFDD and ship resource data bases, SEACOP uses an MSC-maintained ports file along with numerous planning factors and assumptions to identify the types and number of ships required to accomplish the sealift tasks.

Cargo Ship Location Status and Utilization System (CALSTAT)

Using data from three files — Ship File, MSC P-504 Report, and Status Code File — the CALSTAT system generates a variety of reports on dry cargo ship performance for MSC management. Those reports provide extensive information of the voyage of every ship operated by MSC (charter or owned), including itinerary, status, projected port arrivals, miles steamed, fuel consumed, and cargo handling by port.

The Ship File provides basic contractual data for every ship. The primary source of these data are MSC contracts, but the Maritime Administration supplies some data for ships in the National Defense Reserve Fleet and other North Atlantic Treaty Organization ships.

The MSC P-504 Report, also known as the MSC Ship Register, contains ship characteristics data on all ships operated by MSC as well as on those U.S. flag oceangoing merchant vessels over 1,000 gross tons that are either owned by the United States or its citizens or registered in Panama, Liberia, or Honduras.

The Status Code File contains information on the status of all MSC ships, including discharging, ship deficiency, terminal deficiency, and bunkering. MSC area commands are responsible for keeping that information current, and, in so doing, manually collect and submit daily updates.

Since the CALSTAT system operates in a batch mode, it cannot provide information on a selective, as-required basis. Its reports are used by management to support current operations and analyses, such as fuel consumption, stevedore requirements, and port arrivals.

PROFORMA

The PROFORMA model provides an automated means for forecasting a ship's voyage and assessing its expected performance in terms of cost, time, and cargo moved. Its provides MSC personnel with comparative ship voyage, income, and expense data to assist in the requisition and utilization of shipping. The model's tariff rates are updated annually via a batch input of punched cards; new ships and ports can be added at any time through remote terminals.

Sealift Voyage Analysis Program

The Sealift Voyage Analysis Program has been in use since 1969. Using data from the Cargo Final File, the program analyzes all dry cargo voyages in terms of cost, income, and productivity; and determines whether a voyage made a profit or a loss. It also has the capability to consolidate voyages by routes for purposes of evaluating routes. Based on these and other products, dry cargo managers determine whether routes, port-calls, or ships (including all chartered and owned ships) can be eliminated or adjusted. The program is processed monthly on the MTMC Honeywell 6000 computer with input by remote terminal.

Cargo Final File

The Cargo Final File is a monthly report of activity that is prepared from manifests. Also known as the Cargo History Base, it is used for purposes such as preparation of the quarterly industrial fund report, which is the equivalent of a financial statement. The Cargo Final File also provides data for the MSC Quarterly Statistical Report, which includes commodity tonnage by carrier and shipper for each route traveled, information on privately owned vehicles transported, and a carrier summary.

Unit Level Billing System (Manifest Based Billing System)

The Unit Level Billing System is used to bill shippers for all ocean cargo. MTMC books the shipment and prepares the manifest and sends a copy of the manifest to MSC for workload and

billing. It also prepares a control card that tells when the booking was made and whether the rate basis was per diem or point-to-point. This card is used as a check against the manifest. MSC receives daily manifests and control cards, either by direct link or over the Automatic Digital Network in card format.

Each week, the control cards and manifests are merged by machine and automatically returned to the area commands for correction if there is a mismatch. The system automatically computes charges and bills shippers monthly. Magnetic tape is used for billing large shippers, while paper or microfiche is used for small shippers. The billing document provides data for each shipment unit. For personal property, the bills contain the name of the shippers; repair parts shipments are identified by requisition number. The bills are not necessarily sent to the same activities that pay them. For example, Defense Logistics Agency bills are not sent to the Army Finance Center, which eventually will pay the bill.

Petroleum billing follows a different process. MSC schedules all shipments at the request of the Defense Fuel Supply Center (DFSC). It maintains those schedules on an automated file, and at the end of the month, transfers the data from that file to the petroleum billing system, which prints out a listing of the amount shipped and deadweight tonnage by ship.

FUTURE SYSTEMS

Sealift Strategic Planning System (SEASTRAT)

This system will provide integrated data processing support for MSC's Strategic Mobility Office. It will have the following new or enhanced features:

- The ability to produce near-optimum sealift schedules;
- The ability to process multiple Operation Plans (OPLANs) concurrently;
- The capability to prioritize utilization of sealift resources by OPLAN;
- Execution planning;
- Automated interface with the Joint Deployment System; and
- Automated computation of Prepositioned War Reserve Materiel Requirements (PWRMR) for POL.

MSC will issue the request for proposal for SEASTRAT design and development in 1985. The initial task will be to review the 1983 SEASTRAT design against current requirements. It is anticipated that the Scheduling Algorithm for Improving Lift module, the first SEASTRAT module to be implemented, will be operational in 3 years, with full implementation a year after that. SEASTRAT will consist of four modules, which are described below.

Analytic Choice of Origin (ANCHOR) Module. The ANCHOR will improve on the ship availability subsystem of SEACOP by providing more accurate estimates of where ships will be (the snapshot) at the beginning of an exercise or plan. Using data from sets of ship locations (snapshots) that are gathered randomly throughout the year, the module will compare those snapshots with OPLAN performance and choose one that is considered appropriate for a given plan.

Scheduling Algorithm for Improving Lift. This module will replace the SEACOP system. Using a transportation network to optimize a nonlinear objective function by means of iterative linear approximations, it will produce shipping schedules showing both cargo and ship movements for an OPLAN.

Prepositioned War Reserve Materiel Requirements for POL. The objectives of this module will be to satisfy the POL requirements of each OPLAN with prepositioned fuel at specific bunkering areas.

Joint Strategic Capabilities Plan (JSCP) Reports Module. This module will produce the reports that are included in the JSCP Annex J and create the JOPS (or Joint Operating Planning System) Characteristics of Transportation Resources and Transportation Assets files. Using ship characteristics and location data for specific JSCP scenarios and OPLANs, this module will process that data and output it in JSCP Annex J and JOPS formats.

CALSTAT Improvements

The current CALSTAT system has three basic problems: it operates on a time-shared basis using an MTMC computer, it is batch-operated, and it relies heavily on manual input. These factors make for a system that is too inflexible to meet current management needs. To correct these

shortcomings, MSC has contracted for the design of a logical data base for an interactive system. When completed, this data base will be the first step toward the implementation of a new CALSTAT system. However, the Sealift Information Data Base must be established before work can proceed.

Sealift Information Data Base

This data base is planned to be a distributed data base supporting various MSC systems. Its concept, which has not been formalized, envisions a central source of port and ship characteristics data that can be automatically accessed by the other systems. No further details are available at this time.

Automated Payment Reconciliation System

MSC, with the assistance of EDI, Inc., is currently developing an automated carrier payment system. That system will receive booking and manifest data from MTMC and bills from carriers, then it will match those bills and manifests against rates on file and pay the carrier.

This system will make extensive use of electronic data interface technology between MSC and the carriers. The carriers will input their data into the file of a commercial contractor, where it will be converted to a standard data format. When required, MSC will extract that data from the commercial file and convert it to its own format.

SUMMARY

Most of MSC's systems supporting the fleet management and mobility planning functions are old. A major effort to update those systems was started in 1981 but was interrupted when consideration was given to combining MSC and MTMC. Beginning in early-1985, MSC is once again planning to upgrade its systems. However, it will be several years before system upgrades are completed.

APPENDIX H

MILITARY AIRLIFT COMMAND CARGO MANAGEMENT SYSTEMS

INTRODUCTION

The Military Airlift Command (MAC), a specified command, is the single manager for airlift service within the Department of Defense (DoD). In that capacity, MAC provides transportation planning support to the Joint Chiefs of Staff (JCS) and other DoD agencies in support of JCS plans and operations. It also provides airlift service support to DoD Components with government-owned aircraft that it controls and operates, and it operates aerial ports and air terminals at Air Force installations.

This appendix describes MAC's existing and planned cargo management systems and concludes with a summary of automation in MAC systems.

EXISTING SYSTEMS

Aerial Port Documentation and Management System (ADAM)

ADAM I, first implemented in 1971, is a batch-process, card-oriented system that supports most of the cargo processing requirements at five overseas aerial ports. This system processes Advance Transportation Control and Movement Documents (ATCMDs), monitors the status of cargo in the port, provides a terminal inventory, produces cargo manifests, and generates a daily terminal performance summary. Inputs to ADAM I are locally generated or received over the Automatic Digital Network (AUTODIN); the products of ADAM I are transmitted over AUTODIN.

ADAM II operates at Continental United States (CONUS) air terminals, and its implementation began in 1974. It provides the port manager with near real-time capability for processing ATCMDs, generating manifests and intransit data cards, and responding to Air Clearance Authorities. ADAM I and II perform the same functions in a similar way. The primary difference between these systems is the hardware; ADAM I uses Burroughs 3500 computer; while ADAM II uses Honeywell minicomputers at operational locations linked via dedicated communications with host

computers at Headquarters, MAC. Both systems will be replaced by ADAM III (described under Future Systems).

Interim Terminal Overseas Processing System (ITOPS)

ITOPS is a punch-card, batch-process system that was implemented in 1981 to provide 11 small overseas terminals with a less sophisticated equivalent of ADAM. It is a stand-alone system that communicates with the rest of MAC through AUTODIN. The future of the ITOPS system is undecided. It may be replaced by ADAM III or some derivative thereof.

Military Air Integrated Reporting System (MAIRS)

MAIRS gives MAC the capability to track airlift operations on a worldwide basis. Airlift mission movement information is entered into the MAIRS data base through a remote computer terminal from CONUS air terminals, through AUTODIN from overseas units, and through radio message. It provides Headquarters, MAC, with the data required to manage airlift forces and individual missions. It was the first of three systems (the other two are defined immediately below) that MAC has developed to manage airfleet schedules.

Airlift Management Planning and Scheduling System (AMPS)

AMPS is a real-time interactive system that is used to develop route schedules. It provides data to the Airlift Implementation and Monitoring System (AIMS) for development of a consolidated airlift schedule. AMPS has been operating since 1973 and is considered to be outdated.

Airlift Implementation and Monitoring System (AIMS)

AIMS uses data from AMPS and Flow Generator (FLOGEN) to build route structures into a consolidated MAC airlift schedule. It has remote computer terminal and AUTODIN interface capability with MAC subcommands.

Flow Generator (FLOGEN II, III)

FLOGEN II and III produce flight schedules for satisfying airlift requirements during contingencies and exercises. FLOGEN II supports small- to medium-sized plans and has short run times. It will be eliminated when FLOGEN III is updated in 1985. FLOGEN III processes large plans and requires extensive run times. It has several shortcomings: its plans cannot be executed because

they lack the necessary detail; it accommodates only three categories of cargo; and it can use only a few constraints. The system interfaces with the Joint Deployment Agency (JDA), through the Worldwide Military Command and Control System (WWMCCS) Intercomputer Network, by pulling a set of JDA requirements and reformatting them for input and processing in FLOGEN subsystems. Another subsystem translates the output to hard copy for return to JDA.

FLOGEN II operates on either classified or unclassified computers at Headquarters, MAC; FLOGEN III operates only on the classified computer.

Transportation Reporting and Inquiry System (TRAIS)

TRAIS is a new cargo management reporting system that provides several management reports for Headquarters, MAC, and subordinate commands. Those reports provide detailed workload status at all MAC ports, as well as cargo processing data and shipment status by Transportation Control Number (TCN).

Channel Revenue System

The Channel Revenue System is the customer billing process for airlift services performed by MAC. Developed in the early 1960's, it is a batch-oriented system that uses punch card and AUTODIN tape input along with direct communication from some ADAM II and III stations.

On an average of every 5 days, the system processes batches of records from the manifest data collection system and prepares billing tapes as well as hard copy. Approximately 25 percent of the billing process is manual. Current billing procedures are based upon distributing tariff-chargeable costs across all organic aircraft. A cost per flying hour by aircraft is then computed. Any additional expenses not tied to flying hours are distributed over the various cost bases to produce the net tariff cost by type of aircraft.

The master tariff file is a computer disk file of all route (channel) combinations appropriate to the Airlift Service Industrial Fund (ASIF) channel traffic system. The record includes nautical miles, tariff area code, direction code, and U.S. Government tariff rates.

FUTURE SYSTEMS

This section describes three new systems that are being developed or implemented. A new terminal operating system, ADAM III is replacing both ADAM and ITOPS. The Airlift Deployment Analysis System (ADANS) is being developed to replace FLOGEN, the current mobility planning system; and improvements to the current billing system will be incorporated into a new ASIF Integrated System.

Aerial Port Documentation and Management System (ADAM III)

ADAM III is the cargo subsystem of the Consolidated Aerial Port Subsystem, which will also include the Passenger Automated Check-In System. ADAM III eventually will consist of a worldwide network of Honeywell minicomputers linked via dedicated communications with host computers at Headquarters, MAC and various subordinate commands.

The major advance of ADAM III over its predecessors will be its capability to accept real-time data directly from the work area. The system will have automated cargo processing through remote computer terminals and hand-held terminals (HHTs). Ultimately, light pen wands will be used to read bar-coded military shipping labels when they are introduced. The automated data capture techniques will reduce errors and make data immediately available to aerial port managers for assigning cargo to pallets, selecting cargo, and making load-planning decisions. The system will provide the capability to plan loads while pallets are still being processed. A description of how the ADAM III system will work is given in the following paragraphs.

Cargo processing at the port begins with the arrival of a truck at the dock. Aerial port personnel will enter the TCNs of the cargo into the system, which will then verify that the air clearance authority has submitted an ATCMD. If there is a matching ATCMD, the computer will then return all available information on the shipment to the HHT, where changes will be made to the computer record if necessary. If no ATCMD is in the data base, the computer will prompt for the information to construct a cargo record. In either case, cargo status will be updated and the cargo assigned to an appropriate storage area. Hazardous cargo records will be called up on a remote computer terminal and verified for special handling requirements.

The HHT will also be used in making up the pallet. As the pallet is built, the HHT will update the computer. Hazardous cargo compatibility will be checked by the system and warnings returned to the HHT if incompatibilities are detected. When th pallet is completed, the HHT will enter details into the computer, which then will produce a detailed pallet contents listing complete with header information.

ADAM III will have the capability to add or delete cargo from a flight up until the time of departure. The system will produce load pull sheets and final manifests on request and, as the mission departs, the final manifest will be transmitted to the destination airfield via the host computer at Headquarters, MAC. This manifest transmission will enter all details of incoming cargo into the destination computer, thereby allowing management to review incoming cargo workloads. On arrival at its destination, the incoming cargo will be checked with the HHT and compared by the computer against the cargo shown on the manifest.

ADAM III is operational at Travis Air Force Base (AFB), California; Hickam AFB, Hawaii; Charleston AFB, South Carolina; Dover AFB, Delaware; and Rhein-Main Air Base, Federal Republic of Germany and it is scheduled to be installed at 22 locations worldwide in 1987.

Airlift Deployment Analysis System (ADANS)

The primary purpose of this system will be to support the development of Operation Plans (OPLANs). It will consist of three major subsystems: Preflow/Requirements Analysis, Airlift Flow Generation, and Post-Flow/Logistics Analysis.

The Preflow/Requirement Analysis subsystem will extract and edit data from a Time Phased Force Deployment Data (TPFDD) format for purposes of assessing its feasibility. It will also generate reports for TPFDD analysis. The second subsystem, Airlift Flow Generation, will produce a schedule of airlift missions that most effectively satisfies the airlift movement requirements of an OPLAN. It will identify shortfalls and allow the user to modify the flow to determine the most effective delivery schedule. The schedules produced by ADANS will be more refined than those produced by the FLOGEN in that more categories of cargo will be considered and the constraints

applied will more realistically reflect actual conditions. The third subsystem, Post-Flow/Logistics Analysis, will provide the movement tables and other data necessary to support an OPLAN.

The Preflow Requirement Analysis subsystem is scheduled for completion in mid-1986, while the other two subsystems should be completed in late-1987.

ASIF Integrated System

The ASIF system will provide a framework for the development of a dedicated, on-line computer system to support financial management within MAC. It will process manifests daily, which should enhance the billing service; it will mechanize the billing reconciliation process; and it will automate the tariff process. MAC has developed a functional description of this system, which is scheduled to be implemented in the 1987 and 1988.

SUMMARY

Many of MAC's cargo management systems are old and in need of modernization. Some systems are being developed, with the new terminal management system, ADAM III, offering the most improvement. That system will be capable of accepting real-time input data directly from the work area, using such state-of-the-art technology as bar coding and hand-held terminals, and thus it should improve accuracy and speed of processing. Most of the new systems except for air fleet management and scheduling, which are still in the concept development stage, are scheduled to be implemented in the 1987 and 1988.

APPENDIX I

USE OF BAR-CODING TECHNOLOGY IN TRANSPORTATION PROCESSES

As a result of the Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) project, the Department of Defense (DoD) established a standard bar-code symbology for marking materiel, containers, and documentation. Those standards are to be used whenever bar-code marking and reading operations are employed within logistics operations. The DoD also has established a coordinating group to monitor projects initiated by DoD Components to test the usefulness of the bar-code standards in various logistics applications.

Listed below are several LOGMARS applications in the area of transportation that are either being developed or tested.

ARMY

Direct Support System (DSS)/Air Line of Communication (ALOC) Intransit Visibility

The DSS/ALOC intransit visibility application is designed to generate transport control movement data in bar-code format. The data are captured at each movement stage, converted to an Automatic Digital Network (AUTODIN) message format, and then sent to the Army's Logistics Control Activity where they are used to update the Logistics Information File.

Wholesale Shipping

The application of LOGMARS principles to wholesale shipping is being tested at Red River Depot, Texarkana, Texas and Anniston Depot, Alabama. Those tests consist of automating data entry, using both portable and fixed bar-code readers for selecting stock, packaging, consolidating shipments, and loading the carrier. In addition, the Army will use bar-code scanning to track Materiel Release Orders (MROs) through the entire shipping process.

AIR FORCE

Wholesale Shipping System

The first Air Force Wholesale Shipping System will be installed at Warner Robbins Air Logistics Center (ALC), Georgia in 1985 and at the other ALCs by May 1987. In this system, the MROs and shipping labels will be bar coded.

Consolidation and Containerization Points

The Air Force is planning to use bar codes at its consolidation/containerization points to track shipments through those facilities. The approach is being developed at Warner Robbins ALC.

DEFENSE LOGISTICS AGENCY (DLA)

DLA has the lead in the LOGMARS Documentation Test Project, using its Ogden Depot, Utah as the shipping activity. In this project, DLA is printing both the MROs and the shipping labels with the aid of bar codes. A six-digit bar-coded number on the pick ticket triggers documentation printout. DLA is planning to use the same bar code to automatically develop bills of lading.

MILITARY AIRLIFT COMMAND (MAC)

MAC is incorporating the capability to read bar-coded military shipping labels in its new terminal management system, Aerial Port Documentation and Management System (ADAM III).

MILITARY TRAFFIC MANAGEMENT COMMAND (MTMC)

MTMC recently conducted a bar-code test during REFORGER 85. For purposes of the test, military equipment was labeled with 4-inch bar codes. The label information was then read by hand-held scanners and later logged into a computer. Currently, this is a manual process. MTMC is now planning to have LOGMARS equipment at each of its ocean terminals in 1985.

APPENDIX J

THE JOINT PLANNING STRUCTURE

This appendix presents a brief description of the major elements of the joint planning structure of the Department of Defense (DoD) that impact on the cargo management function. These elements are the Joint Operational Planning System (JOPS), the Joint Deployment Agency (JDA), the Joint Deployment System (JDS), and the Worldwide Military Command and Control System (WWMCCS).

The JOPS is a DoD-directed, Joint Chiefs of Staff (JCS)-specified system designed to enhance regional and global joint planning. It specifies the processes to be used in planning joint operations. The process of developing acceptable Operation Plans (OPLANs) is described in the JOPS as "deliberate planning," while the process of developing acceptable operations orders is known as "time-sensitive planning."

The JDA supports the JCS and supported commanders in planning for and executing deployments in support of OPLANs. It serves as the focal point for deployment-associated decision-making information. During peacetime deliberate planning, JDA interacts with the joint deployment community, which includes the Transportation Operating Agencies (TOAs),[1] to coordinate activities relating to plan development, refinement, and maintenance. During time-sensitive execution planning, the JDA coordinates the movement of troops and supplies.

The JDS is the vehicle that the JDA uses to fulfill its responsibilities. The JDS is both a process and a combination of procedures and computer systems that are employed within the WWMCCS to coordinate planning and to monitor movements. The JDS complements the JOPS. It bridges the gap between deliberate operation plan development and time-sensitive planning in crisis situations. The JDS exceeds the capability of the JOPS in that it can schedule strategic transportation and monitor deployment after execution.

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[1]The TOAs are the Military Traffic Management Command (MTMC), the Military Sealift Command (MSC), and the Military Airlift Command (MAC).

The JDS enables the JDA to meet its coordination responsibilities associated with deliberate planning. After the unified commander's OPLAN becomes approximately feasible, the JDA continues OPLAN development through the Time Phased Force Deployment Data refinement process, at which point the TOAs develop movement tables, or schedules of shipments, required to support the plan.

WWMCCS is a set of command and control capabilities supporting the National Command Authorities, the JCS, and major field commanders. The WWMCCS computers are linked through the WWMCCS Intercomputer Network.

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This report catalogs close to 100 data processing systems that assist the Military Departments, Defense Logistics Agency, and the Transportation Operating Agencies in managing the movement of cargo. Most of the systems are old and operate on hardware that runs at or near capacity. All major defense transportation organizations are developing replacement systems, and many will be operational in the late 1980's. But many of those systems will not have the capability to transfer transportation information electronically from

one computer to another; nor will they be sufficiently integrated to correct many of the existing system inefficiencies. To assure better systems integration and interface capability, it is recommended that DoD explore the use of Electronic Data Interchange (EDI) concepts that are gaining widespread acceptance in private industry and which enable the computer-to-computer exchange of transportation information. It is also recommended that OSD task the key transportation organizations to prepare long-range information system plans that specify existing and future automation efforts, and that OSD sponsor forums for senior defense transportation managers where these plans are reviewed with emphasis on identifying barriers to increased systems integration and alternatives for eliminating those barriers.

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